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ABSTRACT

The guidelines and five papers in this report are intended to define the place and purpose of geography in liberal education and to stimulate future actions to improve the content of college undergraduate courses in geography. Its statements of objectives, suggestions, and recommendations are part of an effort by the geographical profession to strengthen geography within the liberal education field. The guidelines summarize the role of geography as a subject in liberal education, describe its objectives, offer three versions of an introductory course, make suggestions for improving teaching methods and teacher training, and give recommendations for further action. The first article discusses the need to study process in perceiving order within the world's spatial complexities. The second underscores area differentiation as a means of understanding differences and linkages among peoples. The third lends insight into geography's unique use of the map as a method of analysis and expression. The fourth presents the case for a unified view of the elements of physical geography. The last considers the role of geography in government as relating to the general concern of Liberal Arts Colleges with Federal careers and programs.
(Author/KSM)

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A REPORT OF THE GEOGRAPHY IN LIBERAL EDUCATION PROJECT

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Preface

The papers and guidelines in this report are intended to define the place and purpose of geography in liberal education and to stimulate future actions to improve the content of college undergraduate courses in geography. The report is addressed not only to professional geographers but also to teachers in other disciplines and to academic advisors and administrators. Its statements of objectives, suggestions and recommendations are, hopefully, the prelude to a vigorous and sustained effort by the geographical profession to strengthen geography within the liberal education field in the United States.

The papers that are presented are representative of both the diversity of views and the fundamental unity that is characteristic of modern geography. In this context, Gilbert F. White discusses the need to study process in perceiving order within the world's spatial complexities. Chauncy D. Harris underscores area differentiation as a means of understanding differences and linkages among peoples, not as an end unto itself. Arthur H. Robinson lends fresh insight into geography's unique use of the map as a method of analysis and expression. M. Gordon Wolman presents the case for a unified view of the elements of physical geography. Finally, Arch C. Gerlach considers the role of geography in government as relating to the general concern of Liberal Arts Colleges with Federal careers and programs.

Background work for the report began in 1961, when the Association of American Geographers appointed a committee to investigate ways in which geography might be introduced into the curricular structure of liberal arts colleges where little or no geography was then offered, and to develop a set of general recommendations for the improvement of college undergraduate grograms in geography. The work of this committee led in 1963 to the establishment of the Geography in Liberal Education Project of the Association of American Geography.

Under Project auspices, leading geographers have been assembled in a series of national and regional conferences to discuss the problems involved, presenting papers and preparing guidelines for the development of introductory courses in geography, and suggesting paths of future action to improve instructional methods. In addition to the papers and recommendations generated by these conferences, many others in geography and related fields have offered suggestions which have been incorporated into this report. Support from the National Science Foundation has made possible the geography in Liberal Education Project, including publication of this report.

JOHN F. LOUNSBURY
Project Director

Guidelines

Summary

"Geography is a very old field of study. Writers of geography were among the earliest scholars of antiquity, and spoken geography must have been widely practiced long before the invention of writing. During the long history of man's effort to gain further understanding of the forces and objects of his environment, the essential nature of geography remained unchanged. Today as in the past, geography is concerned with the arrangement of things on the face of the earth, and with the associations of things that give character to particular places." [1]

The core of geography has changed little over the years; but many developments enable the geographer of today to describe, measure, and analyze differences and similarities among places more precisely and efficiently than ever before. The traditional content as well as the modern perspectives and techniques of geography should form a basic part of college liberal education programs.

A modern geography course will provide the student in liberal education with basic facts, necessary skills, and an appropriate conceptual frame of reference, including the understanding that most phenomena in any area are spatially associated and interdependent; that areas are interrelated; that man is both a creature and a creator of his environment; and that environmental change is a natural function of all world features and relationships. Such a course will effectively demonstrate that the seemingly infinite and fortuitous variety of the earth's surface is capable of orderly description and rational explanation.

For the United States to cope successfully with its own domestic problems and to participate effectively in world affairs, its leaders and citizens must have a coherent understanding of the earth's regions and peoples. In the United States, most educational programs to date have failed utterly to provide such a structured knowledge of the world. To counteract the prevailing geographical illiteracy, major changes need also be made in pre-college programs and in technical and professional training, but the problem under consideration in this report is the improvement of college geography in undergraduate liberal education.

[1] P. E. James and C. F. Jones. *American Geography: Inventory & Prospect.* (Syracuse University Press, Second Printing, 1964): Page 4.

It is out view that new geography courses should be developed, particularly at the introductory level, and that existing courses pertinent to liberal education should be improved. Specifically, we recommend:

1. The development of course outlines and of "model" and experimental introductory courses at various colleges or universities, to serve as guides for the general utilization of subject matter and instructional materials.
2. The creation of a national committee to promote the effectiveness of geographic education in colleges and universities throughout the country.
3. The establishment of national working panels to investigate specific problem areas (e.g. course content and sequence; interdisciplinary cooperation; improvement of undergraduate teaching and materials preparation; presentation techniques and methods).

Geography as a Subject in Liberal Education

Man is innately curious about places different (or similar) and distant from his local surroundings; but man has no inborn understanding of area or region, much less of how natural and cultural phenomena are geographically distributed and associated. Such knowledge is acquired only over a period of time, through both extensive experience and formal education. Geography, as the principal discipline concerned with the orderly recognition, analysis and interpretation of spatial patterns on the surface of the earth, assumes the major responsibility for providing such knowledge.

The place of geography as a subject in liberal education may be viewed in terms of three basic approaches to knowledge:

1. *the systematic approach* (used primarily by the natural and social sciences), defined largely in terms of the types of objects studied and of the processes that affect them;
2. *the chronological approach* (used primarily by history), concerned with the differentiations of the historical record and the nature of change through time;
3. *the chorological approach* (used primarily by geography), focused upon distributions and associations of terrestrial phenomena in the world as a whole and in particular places, and upon the interrelationship and interaction of these particular places.

The chronological and chorological approaches include the concepts and objects of the systematic sciences, but deal with them in the framework of time and space, and thus emphasize the temporal and spatial interconnections of diverse elements and processes. Since an appreciation of the fundamental unity of knowledge is a prime objective in liberal education, the geographic approach is an essential component of it.

The study of geography provides other values to liberal education. Among them are the following:

1. It exhibits the causal interrelations of physical, biotic and human phenomena, and shows how these can serve as clues to the origin and function of socio-economic and political processes.
2. It stimulates the observation of pattern, especially regularity in the occurrence of landscape phenomena.
3. It provides the key to understanding the importance of place in human affairs, in historical as well as in contemporary perspective, so that the student sees the present world in context.
4. It cultivates a sense of value relative to man's stewardship of the earth.
5. It fosters the appreciation of differences and simularities from place to place; the geographer views the world as both richer and more significantly complex because it is diverse.
6. It involves the student directly in the study of the real world (through map and photo interpretation and field work) and encourages him continually to test abstraction against experience.

Geography is concerned with the study of spatial distributions and associations and with area interrelationships. Resulting patterns on the earth's surface have differing meanings for human society, an outgrowth of the techniques and value systems of different cultures. This appears, for example, in the way in which different groups of men have responded to the same physical environment and in how any one group has responded to different environments. Techniques and institutions transplanted into different physical environments help to generate new social institutions worked out to fit new needs which, in turn, lead to the formation of new societies with new value systems. The study of spatial distributions, associations and area interrelationships, i.e. geography, is a basic way of anlayzing human society because it casts the fundamental processes which govern men's life on earth in a spatial framework, thereby giving uniqueness to these processes. Geography, by providing the student with this "spatial awareness", gives a dimension to liberal education without which the study of man on earth is incomplete.

Desirable Objectives of Geography Courses in Liberal Education

Geography courses in liberal education programs should be designed to broaden the student's sphere of interest by adding the spatial dimension to his studies of features and processes to help prepare him for responsible citizenship and to instill a desire for continued learning about the world around him. They should be concerned with broad understanding even when they deal with small areas, and they should provide the student with a conceptual framework within which he can appraise facts and theories from

related disciplines. Specific objectives for such courses may be categorized in terms of:

1. *fundamental emphases*—important ideas, hypotheses, and theories basic to the intellectual framework of the discipline; and
2. *facts and skills*—the data essential as a working background or frame of reference, and the proficiencies needed to collect and collate them.

Fundamental Emphases

Many geographic themes and principles are highly pertinent to a liberal education. These themes comprise the intellectual framework of the discipline and serve as unifying threads through all general geography courses. They include:

1. *An understanding of spatial distributions and associations, and of area interrelationships.* Aspects of nature, culture and thought are spatially distributed in complex fashion over the surface of the earth, and these distributions are causally associated and interdependent. To understand how and why things are where they are and to be able to build realistic mental maps, one must appreciate the implications of relative location, scale and distance as well as understand the various qualitative and quantitative ways of illustrating distribution, shape, density, and movement. From the geographical patterns that emerge, physical and cultural phenomena may be grouped into distinctive or functional areas which are interrelated and meaningful generalizations may be derived. It is the understanding of spatial factors and spatial relationships that gives modern geography its distinctiveness and significance.
2. *An understanding of the importance of time.* All processes on the earth act through time. Time is the perspective from which the student can analyze man's sequential uses of the earth and rates of change in such uses. This perspective enhances the understanding of how land features come to be formed or how raw materials come to be used; and it also serves as a geographical framework in which to evaluate both prolonged transformations such as the spread of the Industrial Revolution, as well as specific events, such as the impact of the Panama Canal on world trade.
3. *A recognition that the world is subject to continual transformation.* Physical and human systems are not static but are in continual flux. Geographically, these changes occur with varying rates of speed from one part of the world to another, from system to system, and from small scale to large scale.
4. *An awareness of man's relations with his physical environment.* Geographical studies cultivate an appreciation of man's reaction upon physical and biotic phenomena, and show how this reaction varies with the level of technical development and the attitudes and aims of a given society.

These are the ways in which the geographer approaches the world, and

they provide a framework for studying the world specifically emphasized by no other discipline. A geography course helps the student to realize that the surface of the earth differs (or has similarities) from place to place; that these differences vary with the scale of observation, and often depend on the role of man as a geographical agent; that these differences are usually systematically arranged in space and can often be readily explained, both genetically and functionally; that change in the nature of places is continuous, though variable in rate, and that some changes are predictable and malleable while others are beyond man's control; and that both spatial differences and spatial change are significant in economic, political and social affairs at every level of geographic scale.

Facts

In the study of geography, as in any intellectual endeavor, emphasis, of course, should be placed on important ideas, relationships and disciplined reasoning, rather than on facts for their own sake. In all disciplines, moreover, a certain minimal factual knowledge is obviously necessary. Normally a student does not now achieve geographical literacy before reaching college. Until precollege programs provide the minimal background, this must unfortunately be included in any general college course. It should comprise at least:

1. a systematic knowledge of the basic distributional character of such world-wide phenomena as climate, cultural systems, population, and resources;
2. a knowledge of the processes responsible for the spatial distribution and variable character of selected landscape features; and
3. a more detailed knowledge of a selected number of individual areas illustrating typical or atypical conditions.

Collectively, this information provides a frame of reference within which the student can interpret the new facts, events, experiences, and problems. Within such a working factual framework, Berlin, for example, will not be seen as an isolated entity to be recalled as an unrelated fact but rather as a location with geographical significance, a necessary key to understanding many conditions and events in Central Europe.

Skills

To understand the fundamental viewpoints, basic ideas and general subject matter of geography, the student must acquire skills beyond those of normal communication. These skills include:

1. the use of maps, globes, and ground and aerial photographs;
2. the use of elementary statistical methods, so that charts, diagrams and other visual methods of presenting geographic information can be understood, and geographic relationships may be tested;
3. the use of field techniques in collecting, organizing and presenting

data; and in particular, the importance of direct observation as a fundamental source of geographic instruction.

Introductory Geography Courses in Liberal Education

The geographical component of many liberal education programs will be improved by introducing new courses and course materials, improving existing courses, introducing new methods of instruction, and enhancing the skills and geographical knowledge of teachers. Various approaches can be offered to stimulate the development of subject outlines and suggested "model" and experimental course programs.

Approaches in Organizing Subject Matter

Geographical subject matter in introductory courses is now usually presented either "regionally" or "systematically". Each approach divides the subject matter of geography into pedagogically convenient categories, the regional into segments of the surface of the earth (e.g., continents, countries, culture areas), and the systematic into topics (e.g., climate, soils, transportation, population). Within each the mode of instruction may be either primarily descriptive and analytic, i.e., dealing with measurement, analysis and classification of phenomena, or problem-oriented, i.e., concerned with the analysis and solution of real or hypothetical problems. These approaches are by no means exclusive. Within a course organized on a regional framework, for example, it is desirable to use the systematic approach to analyze phenomena within a region. Conversely, within the systematic study of geography, data are commonly treated on a regional basis.

Suggested Courses for Introductory Students

The content and intellectual quality of introductory college courses in geography must be upgraded to keep pace with anticipated new high school programs in geography, earth sciences, biology, mathematics and other fields that are now under way. Unfortunately, students entering college in the near future, will not have had a modern high school course in geography, nor probably in a related field. Until this deficiency of our high schools is remedied, introductory college courses should be designed, therefore, for those who have not been exposed to the subject since elementary school.

An introductory course for such students should provide a world frame of reference and a perspective of the topical range of modern geography. Because no single scheme will meet the needs of all educational institutions, at least three versions of a suggested introductory geography course are proposed. Each stresses the desirable objectives and there is, of course, overlap in subject matter and content. Choice of the three schemes will depend upon the purpose, program and curricular structure of the institution, and more specialized or unique approaches should by no means be excluded from consideration as introductory courses.

Introduction to Geography (*Version I—Emphasizing Processes*). This course provides an orderly examination of the world's spatial complexities. Landscape features—landforms, vegetation, soil, land cultivation and use, urban functions, transport routes—would be examined in association with each other. Emphasis would be placed on the *processes* active in shaping the major world arrangement of features and their associations. The student would be encouraged to formulate a systematic set of generalizations, enabling him to presume the association of features in any area. "A liberally educated person should know sufficient about the processes which shape the spatial distribution of selected landscape features, so that with a minimum memorization of basic facts and anomalous relationships he can state with a fair degree of accuracy the complex of landscape features he would expect to find on any given part of the earth's surface, expressly noting the amount of diversity present at any given scale, and the changes he would expect to result from any given shift in conditions affecting the processes." [2]

Introduction to Geography (*Version II—Emphasizing Regions*). This course provides an effective mode of analyzing and comparing domestic and foreign areas.[3] It would emphasize a knowledge of disparate peoples, and cultures; an appreciation of the diversity of the world in terms of its physical makeup and resources, cultural evolution, economic development, and political organization; and an awareness of the economic, political, and cultural ties, as well as the common threats and dangers that affect the nations of the world and that touch off changes in area interrelationships.

Methods of dividing the earth into regions and of analyzing them will differ from one course to another, depending upon the level of instruction and the subject matter emphasized. Whatever method is used, the course should stress spatial analysis and important ideas, rather than regional subdivisions *per se* or an encyclopedic multitude of unassorted and a really unrelated facts.

Introduction to Geography (*Version III—Emphasizing Methods and Theory*). This course would be concerned with the key concepts, ideas and theories in several major subfields of geography, together with a survey of the history of geographic thought. A course of this nature serves not only as an offering in liberal education but also as an introductory or supplementary course for the prospective major. It enables the beginning student to understand the place of geography in the general world of knowledge and the connections between geography and related fields of study.

In addition to the three versions outlined above, other more specialized introductory courses could be developed for liberal education programs. For example, one such course would emphasize the value of maps as an established

[2] For a detailed account see Gilbert F. White: "Geography in Liberal Education", Chapter 2.

[3] For a detailed account see Chauncy D. Harris, "The Geographic Study of Foreign Areas and Cultures in Liberal Education", Chapter 3.

and universal method of graphic communication.[4] It may well be as important to study the various elements of graphic presentation and communication (of which the map is a unique form) as it is to study different methods and forms of verbal presentation. Map interpretation is, moreover, essential in modern life, and as maps collate subject matter from the social and physical sciences and the humanities, their use encourages the student to compare and contrast data from other disciplines in a logical and orderly manner. Other introductory liberal education courses could be part of the inter-disciplinary area or topical study programs which have developed in many American universities during the last two decades. Such programs combine research work and instructional offerings in several fields of knowledge focusing on some area or culture, or on some broad field of knowledge. These programs of study today encompass all the major non-Western cultural realms of the world and such topics as international relations, urban studies, and economic development. Geography, with its spatial and integrative approach, might serve as the core subject in these programs.

Inter-disciplinary studies will probably increase in number and in scope, as they provide the student with an opportunity to analyze several facets of a specific culture or topic in combination. The role of geography in such programs and the contribution of such studies to general education as a whole would be a fruitful field of investigation for new subject outlines and for "model" and experimental courses.

Improving Instructional Methods

It is essential not only to improve the content and intellectual quality of college programs in geography but also to develop new and more effective modes of instruction. Methods and patterns of instruction will probably be explored in detail by specific panels at a later date, but a few such methods may be recommended here as particularly applicable to new courses:

1. Structured self-learning programs and programmed materials might be employed in courses where the student would acquire factual knowledge and basic skills individually and at his own pace.
2. New types of problem-oriented laboratory exercises might be developed specifically for courses employing modern methods of quantitative and qualitative techniques of analysis.
3. New types of audio-visual media (including cartographic) might be employed for particular courses and programs.
4. New (including more rapid) methods for acquiring and analyzing field data might be developed which will help bridge the gap between reality and theory.
5. New ways might be employed to improve lecture-discussion methods.

[4] For a detailed account see Arthur H. Robinson, "The Potential Contribution of Cartography in Liberal Education", Chapter 4.

Improving Skills and Geographical Knowledge of Teachers

New or improved courses and programs can hardly be effective unless they are taught by well-trained and highly motivated teachers. Instructors of liberal education courses in geography must have sound training in the field, in both its physical and cultural aspects, and should share their teaching experiences with others inside and outside geography. Specifically, the skill and background of instructors might be improved through:

1. The organization of institutes and workshops to inform teachers about new developments in geography and new ideas concerning the role of the discipline in liberal education.
2. The distribution of pertinent materials, including newsletters describing new techniques or demonstrations, reprints of pertinent articles not readily accessible, and lists of annotated core textbooks and periodicals.
3. The organization of seminars in which teachers of liberal education courses in geography can meet to share experiences and discuss common problems.
4. The establishment of special field courses in which teachers can learn the new methods used to collect and analyze data and to relate theoretical concepts to actual conditions. The ability to work effectively in field situations is as important for a geography teacher as competence in the laboratory is for an instructor of chemistry or physics

Recommendations for Future Action

One purpose of this report is to set the stage for future work of a more specific and concrete character. The following should be initiated at the earliest possible time:

1. The development of study outlines and of "model" and experimental introductory course programs at a variety of universities or colleges, for which the suggestions and recommendations included in this report should serve as points of departure. Course programs should include the development of concrete subject matter and instructional materials that could be made available for widespread use.
2. The creation of a standing national committee to promote the effectiveness of geographic education in colleges and universities throughout the country. The specific responsibilities of the committee would be:
   a. to develop means of integrating geographic education within the broad context of liberal education;
   b. to consult upon request with individuals and institutions planning to introduce geography into their programs or those contemplating changes in an existing geography curricula;
   c. to coordinate the efforts of institutions and individuals actively engaged in the development of course programs; and

d. to advise and coordinate the efforts of national working panels such as those described below.

3. The establishment of the national working panels, to concentrate on a specific problem area in geographic education. Some suggestions are:
   a. *A Panel on Content and Sequence of Courses* to improve content and determine a basis for a rational sequence of courses in geography and related fields.
   b. *A Panel on Interdisciplinary Cooperation* to help improve communication between geography and related fields. This panel would assess the impact on geography curricula of new programs in related fields; it would determine how to bring appropriate materials from other disciplines into geography courses; and it would be concerned with strengthening geography's contribution to inter-disciplinary area and topical studies programs.
   c. *A Panel on Improvement of Undergraduate Teaching* to investigate ways and means of improving faculty competence, including institutes, workshops and seminars; also, to produce and distribute resource letters, annotated lists of core materials and reprint series.
   d. *A Panel on Techniques and Methods of Presentation* to explore modes of instruction, such as programmed materials, new types of laboratory experiences, audio-visual materials, structured self-learning programs and new ways to improve lecture-discussion methods.

Appendix

This report takes into consideration the views of many geographers who discussed the problems of geography in liberal education at length at several national and regional conferences. Three national conferences of the geography in Liberal Education Project were organized. The first was held in Chicago, Illinois, December 11–16, 1963; the second in Syracuse, New York, April 2–3; and the last in Minneapolis, Minnesota, November 28–29, 1964. The following persons participated in these national conferences:

H. Homer Aschmann, University of California, Riverside.
Rollin S. Atwood, American University.
Harry P. Bailey, University of California, Riverside.
Brian J. L. Berry, University of Chicago.
Albert W. Brown, Eastern Michigan University.
John E. Brush, Rutgers State University.
Martha E. Church, Wellesley College.
Edwin H. Hammond, Syracuse University.
J. Thomas Hastings, University of Illinois.
Nicholas Helburn, Montana State College.
Theodore Herman, Colgate University.
Robert E. Huke, Dartmouth College.
Preston E. James, Syracuse University.
Fred B. Kniffen, Louisiana State University.
Clyde F. Kohn, State University of Iowa.
Harold H. McCarty, State University of Iowa.
Robert B. McNee, University of Cincinnati.
Rhoads Murphey, University of Michigan.
Lawrence M. Sommers, Michigan State University.
Dan Stanislawski, University of Arizona.
J. Russell Whitaker, George Peabody College.
Wilbur Zelinsky, Pennsylvania State University.

In addition to the national conference participants, special consultants prepared and presented papers at the Chicago conference in December, 1963. Authors of these papers that are published in this report are:

Arch C. Gerlach, U.S. Geological Survey.
Chauncy F. Harris, University of Chicago.
Arthur H. Robinson, University of Wisconsin.
Gilbert F. White, University of Chicago.
M. Gordon Wolman, Johns Hopkins University.

In addition, William L. Garrison, Northwestern University, presented an unpublished paper at the Chicago conference.

Nine regional conferences were held in conjunction with divisional meetings of the Association of American Geographers in Washington, D.C.,

on January 24 and 25, 1964; Dallas, Texas, on March 27 and 28, 1964; Berkeley, California, on June 17 and 18, 1964; Binghamton, New York, on October 9 and 10, 1964; Boston, Massachusetts, on October 16 and 17, 1964; Omaha, Nebraska, on October 16, 1964; Bloomington, Indiana, on November 6 and 7, 1964; Columbia, Missouri, on November 13 and 14, 1964; and in Lexington, Kentucky, on November 23 and 24, 1964. An additional meeting took place with selected British geographers in London, England, in July, 1964. At each of these regional conferences, in addition to one or more of the national conference participants who were in attendance, the following persons also participated:

Wallace E. Akin, Drake University.
Lewis M. Alexander, University of Rhode Island.
Stanley A. Arbingast, University of Texas.
Kenneth J. Bertrand, The Catholic University of America.
Elaine Bjorklund, Vassar College.
Robert D. Campbell, George Washington University.
H. C. Darby, University College, London, England.
Edwin B. Doran, Jr., Agricultural and Mechanical College of Texas.
Robert W. Durrenberger, San Fernando Valley State College.
Charles A. Fisher, The University of Sheffield, England.
Alice Garnett, The University of Sheffield, England.
Clarence J. Glacken, University of California, Berkeley.
Marjorie S. Goodman, University of Detroit.
B. LeRoy Gordon, University of New Mexico.
Melvin E. Hecht, University of Arizona.
Lorrin G. Kennamer, Jr., University of Texas.
William A. Koelsch, Florida Presbyterian College.
Fritz L. Kramer, Sacramento State College.
Edward J. Miles, University of Vermont.
Raymond E. Murphy, Clark University.
Merle C. Prunty, Jr., University of Georgia.
Benjamin F. Richason, Carroll College.
Allen A. Schmieder, University of Maryland.
Cyrus J. Sharer, Villanova University.
Dan J. Sinclair, London School of Economics, England.
Edward J. Taaffe, Ohio State University.

Special acknowledgement is made to Saul B. Cohen, Executive Officer of the Association of American Geographers and to David Lowenthal, American Geographical Society, who served as consulting editors of the guidelines section of this report, and to Edward B. Espenshade, Jr., President, and Norton S. Ginsburg, Secretary, of the Association of American Geographers for their valued comments.

Geography in Liberal Education

GILBERT F. WHITE

It is ironic that at a time when the United States commands great influence in world affairs its citizens are at a low stage of literacy as to the nature of the globe's surface and its educators are uncertain how to remedy the lack. But it is hardly less ironic that in several other high-income countries such as Germany and Great Britain which grow in an utterly unprecedented complex of economic and political organization there also is serious doubt as to the place in the educational system of teaching about the earth as the home of man. The United States, after a long period of neglect, now seems to be moving haltingly toward correcting geographic illiteracy in its own schools and universities.

There are signs of widening recognition that if citizens are to develop systematic understanding of the world, a realignment of instruction at both the high school and college levels will be in order. This paper suggests a realignment which hinges on improving geography teaching in high schools. Implications of such improvement for liberal education in the colleges are illustrated by ways of dealing with resource management and conservation in undergraduate teaching.

By liberal education is meant that education, including work at the high school level, which cultivates reason and analysis, and deals with the aims and modes of human life. It includes consideration for the esthetic, spiritual, and physical development of the student. No definition of geography is offered. The following discussion will make it obvious that the teaching about the world which I believe is needed will be drawn primarily from research and instruction commonly known as geographic.

SUMMARY OF ARGUMENT

While the part which analysis and fact about the earth's surface can play in liberal education is vitally significant, the time required to teach this effectively is small relative to the total time available to students, and to the time required to teach some other disciplines of thought. Fundamental concepts, skills, and facts should be taught throughout grades 4–8. In order to gain a basic command of this discipline of thought it is essential that all students devote a solid year of geographic study, preferably in association with a new earth science offering, above the elementary grades. Certain

problems and refined methods should be encountered during the college years by those students going beyond high school.

If basic concepts, skills, and facts were properly taught at the high school level the existing introductory college textbooks could be discarded. If more sophisticated problems and methods then were taught imaginatively at the college level the demand for teachers would enlarge, and the need for quality in undergraduate teaching would become painfully acute. Such a shift would sharpen a chronic question as to how much of what is taught in geography departments contributes to genuinely liberal education. For a reform along these lines would expand tremendously the number of students reached by a few thoughtful courses and eliminate most of the so-called advanced courses. It would be good for the students and highly salutary for promotion of geographical knowledge.

These judgments grow out of recent attempts to appraise the place of what is called geography in the educational process. They form an argument which I first shall state in the more earthy terms of high school teaching aims.

High School Geography

The development of geographic understandings as a part of the educational system in the United States appears to be at a critical stage. In this stage the treatment of geography in the high schools is crucial. High school efforts shape the goals and expectations of elementary school teaching and they set the base from which college teaching begins. In recent years the march of political and scientific events has made undoubted an already chronic need for cultivation of a disciplined method of looking at the world in all of its diversity. At the same time, ferment and reform in the rank of scientists, teachers, and administrators create a relatively fluid situation in which the teaching of such method with clear aims and by sound means might find cordial reception. Whether or not geographers as a profession will greatly promote improvement in that direction will rest largely upon their individual efforts as authors and teachers, and in part upon their collective efforts in the High School Geography Project.

The High School Geography Project

The first two phases of this attempt to improve high school geography were begun in 1961 under the guidance of the Joint AAG–NCGE Committee on Education and with the support of the Fund for Advancement of Education. In its first phase an Advisory Paper was compiled based on materials submitted by leading scholars in the discipline. The Advisory Paper sets forth attitudes, concepts, facts, and skills which these scholars thought should be stressed at the high school level. In the second phase ten teachers were released from their regular teaching assignments to experiment in the development of teaching materials and units of instruction in the ninth and tenth grades.

The Joint Committee was strongly assisted in the first phase by the members of a working group of teachers and university geographers and by its director William Pattison. For the second phase the experimenting teachers were joined by twenty cooperating teachers, and thirty voluntary consultants in colleges and universities, in a venture for which Pattison continued as director, and Henry Warman served as field coordinator. Clyde Kohn gave his vigorous leadership as co-chairman with the collaboration of Chauncy Harris.

Next step

A recent grant from the National Science Foundation provides that the project in its third phase will design a one-year course or alternative courses to present the fundamental concepts and skills. In harmony with those courses it is to prepare teaching materials and teachers guides for some sample teaching units. It also is to facilitate exchange of experience among the many people now interested in improvement in high school geography. In the fourth phase complete courses would be prepared.

It would be premature to forecast precisely how the Steering Committee with its director, staff, and consultants will do this. It is not premature to ask what might be the educational effects of a one-year course and what might be their implications for the teaching of geography.

What will be the educational outcome?

Let us assume that phases three and four are completed, and that the anticipated courses are tested and in operation. What then might we hope would be the outcomes in terms of the intellectual development of the student?

One form of answer is given by the Advisory Paper prepared in the summer of 1962 by Pattison and Fraser Hart. This lists desired attitudes, knowledge, and skills. The attitudes and appreciations are organized around six summary topics as follows: 1) the winning of knowledge, 2) seeing things for oneself, 3) location and distance, 4) the uniqueness of places, 5) the natural environment, and 6) world societies. Under the heading of geographic knowledge are four concepts and four sets of facts. The principal concepts are: 1) map representation, 2) the region, 3) man-land relations, and 4) spatial relations. The later includes ideas of a) location, b) distribution, c) associations, and d) movement. These concepts are seen as grounded on knowledge of specific facts of: 1) place locations, 2) order of magnitude, 3) world patterns, and 4) content of area. Specific skills about which there would be little debate are: 1) map reading, 2) map interpretation, 3) comprehension of geographic literature, and 4) production of creative geography.

Most geographers will read rich meaning into these abbreviated aims. They have much in common with aims as formulated in publications by Parker, Kohn, James, and the NCGE Curriculum Guides Committee. They hardly require elaboration before a geographic audience.

When they emerged from the first phase I found them comprehensive and comfortable. As I observe what has happened to them in the hands of skilled teachers, and as I encounter difficulty in explaining them to workers in other fields, I find myself looking for a more explicit and precise way of stating them.

This has led to a second, simplified form of answer. Let me state the aims in one proposition which may be susceptible of consistent application as a criterion for selecting, organizing, and teaching geographic understandings. The proposition is this. *A liberally educated person should know sufficient about the processes which shape the spatial distribution of selected landscape features so that with a minimum memorization of basic facts and anomolous relationships he can state with a fair degree of accuracy the complex of landscape features he would expect to find on any given part of the earth's surface, expressly noting the amount of diversity present at any given scale, and the changes he would expect to result from any given shift in conditions affecting the processes.* Such an effort is practicable. It offers a powerful tool to apply to teaching. If applied, it would lead to an immensely strengthened grasp of both our knowledge and our ignorance of earth phenomena.

Let me now be more specific as to what is meant by landscape features, processes, basic information, anomolous relationships, degree of accuracy, diversity, and confidence as to the effects of process alteration. By landscape features is meant as a minimum ten features: heat budget, water budget, landform, vegetation, soil, proportion of land cultivated, use of uncultivated land, pattern of managing cultivated land, pattern of urban functions, and arrangement of transport. Others might be added but these are regarded as essential. They do not form a single system, unless all earth phenomena are seen as parts of one embracing system. They represent the complex interaction of several systems, or sub-systems, and they are taken in association. These landscape features in association go far toward describing the variations in the earth's surface which are related to population distribution and configuration.

By processes is meant those models of relationships among earth phenomena which help describe regularities in landscape features. There are a relatively small number of such models and they are far more satisfactory for some physical phenomena than for social phenomena. Regularities are more apparent in climate than in urban functions, and the total number of usable models is small. They include water balance, the hydrologic cycle, plant association, hydrolysis, comparative advantage, central place theory, cultural change, and decision-making theory.

Obviously, there are features such as problem climates, azonal soils, and abnormally large urban clusters whose distribution only can be understood in terms of anomolous relationships. These anomolies can be learned either as exceptions to regularities or in relation to other information that must be memorized. For example, there is no satisfactory model to describe the distribution of elevations and bedrock materials on the continents, or the distribution of cultures. Nor is there any ready way of describing variations

in local land forms: studies of unique historical process may be desirable. These sometimes must be learned with little structure of thought, and their lack of system reveals important unsolved problems in science. But once learned they enable us to go far toward predicting climate, soil, vegetation, and farming types.

Any such predictions must specify the rough degree of accuracy which attaches to an estimate and the degree of diversity which prevails in reality. It is practicable to indicate that within a 10,000 square mile quadrangle a general soil class, such as podsol, might be expected to prevail with a given range of error and that within that class, a certain amount of deviation might be found.

One test of the understanding of processes and their results is recognition of the ways in which landscape would be altered by a change in one element in the ecological complex. Thus, the likely consequences of a change in grazing practices upon water budget as shown in stream regimen, or of a change in highway location upon pattern of urban functions can be estimated roughly.

Under this formulation the criterion for selecting teaching materials is their utility in learning at the earliest possible time how to predict the nature of the earth's surface and its susceptibility to change. In stressing regularities our ignorance of other relationships is emphasized. Two types of predictions are served. First, the association of specified landscape features and their local deviation is deduced from given models and facts. Second, the likely alteration of landscape features when there is a change in one element affecting a process is also deduced from a combination of models and facts.

Quality of Analysis

The type of analysis which is required to make these predictions is developed more fully in geography than among other conventional disciplines. It draws contributions from biology, physical sciences, and other earth sciences and social sciences. The importance of such analysis can be asserted without suggesting that it is all of geography and without claiming that geography integrates other disciplines. If our concern is with cultivating analytical power, our interest should not be in advancing geography as a subject, whatever our emotional ties to it, but rather in using geographic discipline to the fullest in advancing this educational aim.

The kind of geography instruction which many uninitiated still impute to the discipline would feed the students as many facts as he could digest to achieve this aim and would throw in a good many interesting, curious, and irrelevant items to spice the dish. The kind of instruction which many geographers seek but which they cannot fully attain is one that would stress the method of sorting out and analyzing the minimum number of facts with a maximum use of explanatory models to make both types of predictions. Teaching should go as far in the latter direction as geographic knowledge, teaching skill, and student readiness permit. There are obvious limitations.

The more fully the teaching stresses understanding and logic in predicting associations the more nearly it satisfies our aim of cultivating reason and analysis, and the more it demands of the teacher. The more thoroughly it stresses the gaps in knowledge, the great problems and possible ways of attacking them, the more successful it is in confronting issues of the aims and modes of human life.

Several forms of test can indicate more explicitly where this may be expected to take the student. He should be able to read the name of a place previously unknown to him and then, armed only with an outline map of the continents on which the place would be located by latitude and longitude, reason out a fairly accurate statement of the association of landscape features he might expect to find there. Some areas such as West Africa south of the Sahara would be long on regularities, while others such as complex urban settlements centering on mineral deposits in South Africa would be long on special anomolous facts. Another form of test would be to study a large area such as the Indian subcontinent in some detail and then identify the principal landscape associations and processes which appear to be anomolous. Or, confronted with a detailed map or aerial photograph for an unidentified area he should be able to make a moderately good stab at locating it. Still another test would be to design hypothetical areas with given facts and to ask what landscape associations and process alteration might be expected.

Scale is important in several ways. As it changes so, too, does the level of generalization as to both landscape association and deviation. In addition, the amount of facts to be learned varies with the level of generalization. Faced with the need to restrict the total volume of facts to be learned, the teacher may restrict either the facts having global significance or those having more limited application on a regional scale.

To re-state this more explicitly, and at the risk of gross over-simplification, we might say that the final and only significant test that need be applied to the adequacy of instruction would consist in asking a student to put his finger in a random fashion on the globe. Once he had located a spot on the globe he would be asked to predict what association of landscape features he might expect to find at that place, indicating the scale of generalization which he would give for that area and the degree of diversity which he might expect among those characteristics. He also would be asked what he would expect to be the consequences of altering an element in the ecological complex. In order to do this the student would need to command the attitudes, concepts, facts, and skills stated in the Advisory Paper, but the selection of materials and exercise of reasoning would be directed toward a sharply focused end. Such focus no doubt would obscure some interesting facets of thought while sharpening the recognition of others.

The student thereby develops skill in using both knowledge of process and knowledge of required information to explain deviation and anomalies. This is a skill which comes partly from habit, partly from rigorous analysis, and

partly from intuition. All these should be exercised. Factual material should be learned to either support or supplement the models of process. In a rational and analytical way the student thereby should develop a spatial framework in which he can confine and organize the flood of information he thereafter will acquire about the earth as habitat.

I am acquainted with a number of geographers who say this resembles their aim in current instruction in geography and who do indeed give a final examination of the character suggested. However, no geography textbook to my knowledge fully takes this approach. There is no set of instructional materials at the high school level which presently would permit an interested but modestly prepared instructor to pursue it rigorously.

This alternative answer to our question as to educational outcomes has a number of merits.

1. It consistently emphasizes structure of thought, and draws upon facts and skills only insofar as they are essential to support or supplement deductive processes.
2. The student promptly begins to build a logical, orderly framework of ideas to which he can relate the immense volume of information about the world that pours in on him from other sources.
3. A single, firm criterion is provided for deciding what information is relevant to teaching. The test always is: Does this advance the ability to predict?
4. Although the aim is simple, it lends itself to being reached by a variety of routes suited to teacher, student, and curriculum. It can be attacked by either inductive or deductive methods. It can begin with systematic topics or with sample regions or with world distributions.
5. It is explained rather readily both to the non-geographer and to the unprepared teacher as a clear and clearly useful educational goal.
6. At the same time it avoids debate as to disciplinary boundaries. In the interest of efficient teaching, encouragement is given to using concepts and skills from other fields—plant association, energy exchange, set theory acculturation, for example—just as far as they contribute to predictive ability. There is no time or need to duplicate whatever may be taught of these concepts in other courses; the emphasis falls upon using them in a meaningful framework which is not provided by any other field. For this reason the approach then becomes welcome as a means for showing the relevancy of physics or biology or social science to explanations of spatial distributions.
7. The teaching constantly exposes both teacher and student to the limits of our knowledge about area and process. Our ignorance is indeed appalling in some sectors of the field, and this ignorance should receive explicit attention rather than being glossed over with accurate description for particular places.
8. The student enjoys a lively sense of discovery and of problems to be

solved. He is confronted promptly with puzzles and with speculation as to how answers may be found.

Against these possible advantages we may array some of the demerits of this answer to our question.

1. There is no well organized body of generalizations upon which to draw readily. Efforts of our most thoughtful colleagues would be required to arrange and sift the knowledge we have of regularities and anomalies. The deficiencies are especially great in dealing with human phenomena.

2. It is likely, moreover, that when this knowledge is available in orderly form it will reveal such large gaps as to discourage enthusiastic teachers. Some may prefer limited, authoritative descriptions to broader question marks.

3. Any such formulation carries the risk of narrow, unimaginative application. This is a cost which should be balanced against the cost of irrelevant description.

4. There also would be the danger that students as well as workers in other fields would regard this formulation as delimiting all of the geographer's knowledge and research, thereby ignoring certain interesting problems.

5. In any event, it would find many teachers unprepared or unwilling to accept it as a guide to their classroom efforts. It would require a kind of discipline that teachers may lack, and it would discourage colorful and often interesting indulgence in describing the unique.

Is there any more satisfactory way of putting the intellectual experience which we might wish for every citizen who seeks coherent methods of comprehending the world's diversity? If there is a better way, we should embrace it. If not, this one deserves the most vigorous attention.

To some, the suggested definition of aims may seem a strained interpretation of an old view. I am inclined to think it is more than this. It may state a distinction that is a basic one to solid improvement in teaching at this stage. Students are in need of an orderly framework for examining the complexities and problems presented by the constantly changing character of the earth's surface. With this framework in mind we turn to its implications for liberal education in college.

Geography at the College Level

Consideration of educational needs at the college level rests initially upon assumption as to what will be done in the high school. If high school courses with the aims suggested above are offered with the aid of new materials and in-service teacher training, then students can proceed to a much more refined treatment of the problems raised. If no such high school course is offered, then the equivalent of the high school course would be needed at a somewhat higher level of sophistication as the introductory course at the college level. This will not be easy, for the teaching material is not now available in text form. Indeed, it seems clear that until high school geography is improved the

major challenge to beginning college efforts in geography should be in devising elevated substitutes for what should have been done before the student gets to college.

There is, of course, another position which may be taken. Some may argue that neither high school nor college geography can be improved along the lines suggested, and that we should hold to prevailing aims and methods of regional description. Under such a view geography apparently has little to offer to liberal education, for it then contributes little to reason and analysis, and offers slight critical assessment of the aims and modes of human life.

Role of Geography at the College Level

Assuming that improved high school courses will in time be taught, we may ask what then should be the role of geography in liberal education at the college level. I think it likely that the major role should be elaborating what is introduced at the high school level with emphasis in two directions: 1) to indicate more precisely the nature of the gaps in our understanding of earth processes, and 2) to suggest important applications of knowledge we do have to problems in the natural and social sciences. Every student should be given opportunity to exercise his command of regularities and anomalies in spatial distributions, to confront the unsolved problems they present, and to sense their significance for understanding aspects of other disciplines of thought. This can be achieved without heavy expenditure of time by the student. The equivalent of one or two semester courses for one year should be sufficient to reinforce earlier teaching, to open up the vistas of scientific perplexities, and to demonstrate the relevance of geographic analysis in other fields of study. At some stage field work would seem essential to understanding the nature of the great problems. More than this probably is not warranted at the undergraduate level unless one of two other aims are to be served.

First, there are no doubt curricular situations where a particular geography offering at the introductory level may serve a more complicated aim. For example, an area study program may require detailed study of one region. Or an international relations program properly may call for advanced work in political geography or in the environmental conditions of international trade.

Second, further study in geography may be a reasonable framework for major concentration by advanced students if certain conditions are met. To meet the aims of liberal education, the advanced offerings should concentrate on problems, methods of solution, and application rather than on description of regions. The ordinary regional course and much systematic work fails to do so. Time is lost on static description which might be better spent on understanding of process and method. A major sequence would include only a few courses in geography and a careful and rigorous exposure to analysis in related fields. Majors which require or permit undergraduate students to

devote the greater part of their time to geography as now taught are a disservice to liberal arts students. Nor are they helpful in the preparation of professional geographers.

I do not think it matters a great deal which subject matter of geography serves as the vehicle to deal with unsolved problems and applications beyond the improved high school level. Curricular setting, faculty preference, and student motivation may influence the choice. What is most important is that problems examined have intellectual significance and that they be treated with discernment and precision. Environmentalistic explanation may provide the point of departure in a social science course, the Malthusian Theorem may spur examination of geographic method in the context of international relations, the inadequacy of models for drainage basin development may offer a point of departure in a general geophysics course. But this is not to say that a great proliferation of courses dealing with all such problems is to be desired. Summing of separate courses may not increase the intellectual contribution. The major understandings of problem and application can be gained in one or two courses. More than that is likely to be sterile or redundant.

My suggestion therefore is that liberal education calls for an improved high school geography supplemented by a year or so of college level geography, with the content of college work to be whatever seems a suitable vehicle for carrying the student to more advanced understanding of problems and applications. Further work would seem justified only as a service to other disciplines or as a sinewy framework for study in related fields. This is a modest view of geography's contributions but I believe it to be a sane one that emphasizes intellectual growth of students rather than imperial growth of departments. Like a trace element in a diet, the need for geographic thought is quantitatively small but qualitatively vital.

The geographic contribution can be made in a wide variety of institutional situations, but the arrangement put forward here is not compatible with the geographer who wants large numbers of major students or who feels the value of his department is determined by the size of the staff. Neither does this view dictate that instruction to be effective cover all areas of the world or all systematic fields. It lends itself to large diversity so long as quality of analysis and significance of problem are in the forefront.

I do not think an intellectually ordered sequence of geography courses beyond the improved high school level now is possible. What is possible and highly desirable is a variety of courses pursuing roughly common aims by diverse means with high standards of performance. To illustrate what I have in mind I might cite such courses in other institutions, but I am expected to speak from my own experience and I shall describe two efforts which fall short in quality but embody the aims. In each case I would be the first to say no student need be exposed to that course if he can find the same interest in problem and application elsewhere. In each case I would be ready to admit that another course with different methods may well be more effective in

reaching the stated aims. One is a course dealing with resource management. The other focuses on the changing face of some part of the earth. Let me explain what I have in mind for each. Both assume an elementary knowledge of geography.

Resource Management

Under the heading of resource management I attempt a systematic examination of the circumstances in which human decisions are made as to resource management and the way in which these decisions vary in space. This seeks to set up a framework within which regularities and anomalies in management patterns can be explained. The importance of such examination can be shown in the setting of Malthusian theory, and of the problem of disparate income levels.

The course introduces a model of decision making which is sufficiently broad to include the classical economical model of optimizing behavior along with the satisfying behavior of Simon and the sociological synthesis offered by Firy. In this model, every resource manager is considered as being presented at any given time with a theoretical range of choice of ways of manging a resource within which he has, in fact, a practical range of choice which is set by the specific characteristics of four elements in decision making. These four elements are: 1) assessment of the resource, 2) technology available for resource use, 3) economic efficiency of resource use, and 4) spatial linkages of such use with other areas. These four elements in decision making are in each case conditioned by cultural and social factors. By culture I mean standardized behavior traits. By social I mean social organization as shown in administration and law. Every group of managers can be shown to take into account in some fashion each of these elements and to pursue some strategy of decision making which can be identified by observation and compared with theoretically pure strategies according to whatever criteria may be desired, including the standard optimizing criterion of the economist.

By applying this model of decision making to a series of resource management problems in specific areas the student examines how the limiting conditions and the factors affecting average performance vary in space. He is confronted, for example, with the sharp distinction which can be made between individual perception of a resource and the perception which a scientist might have in the same circumstances. He is shown the difference between the decision criteria of a subsistence operator who is satisfied with minimum food production and that of a commercial operator who consciously seeks to maximize the average net returns. All of this is by way of helping explain the manner in which the decisions as to resource management can be expected to change as changes in technology or in social and cultural conditions may affect the process of decision making. This then emphasizes the regularities of spatial distributions, the gaps in our understanding of them, and our capacity to apply them to changing physical and social situations.

Landscape changes

Another way of arriving at the same understandings is to analyze changes of the visible landscape of an area. As I have tried this with undergraduates I have found that if approximately ten to fifteen visible changes are examined critically, very much the same insight as to process and as to distribution which I have outlined above can be revealed. Let us take as examples of shifts in the visible landscape: changes in the pattern of the crop land: changes in the configuration of water on the land, including terraces and reservoirs; changes in highway routes; and changes in the distribution of commercial land use. For each of the changes three questions may be asked: 1) what is the extent of the change in area and in amount? 2) what models do we have to explain how this change takes place, and how satisfactory are the models? 3) what models do we have to enable us to judge the effects of these changes in both the natural and the social world?

If we ask these questions for such an item as crop pattern in the United States, we not only describe the changes that have taken place in types of farming areas but we soon get on to the problem of how much we understand as to the inter-regional competition, comparative advantage, agricultural location theory, economic optimization, and social controls, including price supports and land use regulation as they affect this pattern. This then leads us to a consideration of the effects which can be predicted from shift in the pattern, effects which may show themselves, for example, in the character of farm life or in the flow of the silt and water in stream courses.

Approaches such as these, while in no sense put forward as exemplary, do suggest an effort to build to more difficult problems and applications from basic understandings which would first take shape at the high school level.

Geographers more than any other group have an obligation to flavor liberal education with a persistent concern for cultivating a disciplined view of the earth's surface as it changes. They can do this by focusing on questions of process and regularity at the high school level, and by elaborating those basic understandings at the college level with examination of unsolved problems and of applications in related fields. To do so would require realignment of teaching aims and methods. They would seek to reach every student at both levels. While their claims for advanced study in colleges would be mod[illegible] their basic effort, if it were to receive the friendly encouragement which may be expected, would call for intelligence, skill, and numbers of experienced teachers far beyond the present supply.

The Geographic Study of Foreign Areas and Cultures in Liberal Education

CHAUNCY D. HARRIS

One of the most dangerous features of American civic life today is the rise of political extremism, born in part at least out of fear of the unknown. This fear may take the form of an uneasiness in American relations with foreign countries. It finds expression in violent protest against the United Nations, foreign aid, American commitments to allies, negotiations with the Soviet Union, or cooperation with the newly independent states of Asia and Africa. It arises out of a colossal ignorance of the modern world and its problems, out of a naive and ill-formed fear of anything foreign or strange. One of the greatest potential contributions of a liberal education is to provide knowledge and understanding of the magnificent diversity and the high cultural attainments of the peoples of the world and thus to immunize citizens against the viruses of hate, suspicion, and misunderstanding.

A liberal education should develop in each individual the realization that his own country, region, and ethnic, religious, or linguistic group is but one among many, each with differing characteristics, and that other countries, regions, or social groups are not necessarily queer, or irrational, or inferior. It may be argued that one cannot see his own country and culture in perspective until he has studied other lands and peoples. Only then can one realize that his own civilization is but one of a family of civilizations with common elements yet distinctive characteristics, evolving through time from common antecedents with differentiation but with much cultural borrowing, facing similar problems yet with particular combinations of attitudes, policies, technologies, climates, soils, minerals, and evolved economic systems.

"To see things in perspective" suggests the capacity to distinguish the significant from the insignificant, the important from the trivial, the enduring from the fleeting. But perspective in insights as in ordinary vision depends on the ability to see things from more than one viewpoint. Just as a person with two eyes can see actual physical objects in stereoscopic depth, so an individual with knowledge and understanding of more than one culture or region may have a deepened outlook of the world and a heightened sensitivity to its highlights and shadows. Anyone who knows only his own culture and country may have a very flat picture of the world indeed.

One of the aims of a liberal education should be to stimulate, satisfy, and

stimulate anew the love of adventure and romance in learning about the distant peoples and places. From time immemorial people have been curious about how foreign lands and cultures differ. Today jets bring all countries of the globe within hours of one another in travel time but not necessarily closer in understanding. Travel, telestar television, and world-wide news reporting increase the flow of spot information about all parts of the world but do not necessarily provide the context of land and culture. Is our liberal education meeting the challenge of adequately providing a frame of reference of the world, a methodology of learning about foreign areas, a habit of continued curiosity that leads to a life-long quest for further knowledge and understanding?

I should like to discuss briefly four topics: (1) the attitudes, concepts, and facts which might be developed in geographic study of foreign areas; (2) the rise of regional geography in American universities; (3) the advance of multidisciplinary area studies; and (4) some of the potentialities and pitfalls in the geographic study of foreign areas.

Attitudes, Concepts, and Facts to be Developed in Geographic Study of Foreign Areas

I wish to state explicitly at the very beginning some of the attitudes, concepts, and facts which in my view should be developed in a study of foreign areas in liberal education.

Three key attitudes might well be inculcated:

(1) Appreciation of the diversity of the world in physical elements and resources, in cultural evolution, in economic development, in political organization, and in their combination in specific regions.

(2) Sympathy for and understanding of the diverse cultures of the world, each with its particular achievements, viewpoints, and problems. Realization that each has its own integrity and that none is odd merely because different.

(3) Recognition that the regions of the world are linked together by economic ties of trade and aid; by political ties of the association of countries in international and regional organizations; by cultural ties in art, music, and literature; by scientific ties in education and research; and by common dangers of disease, war, famine, poverty, and catastrophes.

The following concepts could be developed in the study of foreign areas:

(1) Man-land relationships. Man does not live in a vacuum or in utopia but on the surface of a globe at actual places. His activities are intimately interconnected with a whole network of human and physical phenomena. Man has his feet on the ground or lithosphere, stands erect into the atmosphere which he inhales rhythmically, and quenches his thirst from the hydrosphere. His utilization of natural resources depends on the historically evolved tools, techniques, attitudes, knowledge, facilities, systems of production, exchange, government, and numbers and distribution of population.

Typically the culture mediates between man as an individual and environmental factors or resources. The relationship of man and climate or soil, for example, depends on the agricultural systems and on current economic conditions. A discriminating concept of man-land relationship in all its variety and complexity avoids both a crude environmental determinism at one extreme and an absence of any sense of site and situation on the other. Areal variations in man-land relationships depend on the areal diversity of both the physical world and the cultural realms. The former is illustrated by the differences in equatorial and middle-latitude agriculture; the latter by the contrasts of Chinese and American farming. The study of regional cultures forms one fruitful approach to the whole field of man-land relationships.

(2) Regionalism. Physical, biotic, and human conditions vary enormously from place to place. These variations are often associated in meaningful ways which make possible the recognition of regions. Physical regions, such as those of climate, have associated agricultural possibilities. Human regions often are characterized by the coincidence of many cultural traits such as language, religion, level of education, political institutions, type of economic activity, stage of economic development, and types of resource utilization. The greatest generalization of geography is that phenomena differ from place to place and that these variations are ordered into patterns which can be described and often explained. A closely associated generalization is that the surface of the earth can be divided into regions on the basis of the variation of single or multiple phenomena and that such regional division and organization of data further both understanding and prediction.

(3) Interrelationships. There are many cycles of interrelationships in the study of either systematic or regional geography. In industrial location and economic development the role of cultural and economic momentum may be crucial. The rise of a manufacturing region reflects resources, markets, labor, and skills not only of the present day but also of the time of earliest development, perhaps decades or centuries ago. The industrialization of Lancashire or New England is a maze of interrelationships present and past, human and physical. The agricultural regions of the earth reflect diversity of climates and soils on one hand and the spread of systems of cultivation on the other. Systems of cultivation are often closely associated with regional cultures.

(4) Areal structure. The earth and each of its regions have areal structure with a specific layout of land and sea, plains and mountains, rivers and lakes, cities and towns, farms and forests, pastures and deserts, railroads and roads, and distribution of languages, religions, ethnic groups, and occupational groups. The map is the most powerful tool in the depiction of this structure. Scale is an inherent characteristic of structure and of degree of generalization. The arrangement of things in space, the patterns of individual and associated elements, is a key geographic concept.

(5) Evolution. The world is in a process of continual change. These

changes have strong regional diversity. Some regions are undergoing rapid cultural change and economic development; others are relatively stable, even stagnant. In the past some geography books have presented only a static world; such a picture may be deceptive.

Some of the facts that should be learned in the study of foreign areas are:

(1) The most significant features in the principal world regions. Facts are meaningful and memorable only if they have some orderliness and association or relationship with other facts.

(2) Patterns of distribution of major physical elements, world cultural spheres, population, level and type of economic development, and political units.

(3) Place locations. These need not be large in number but should include key orienting or strategic points, such as London (Greenwich), Singapore, and the Suez Canal.

Regional Geography

Regional geography has been an integral part of geography from its very founding. Hartshorne has traced the rise of regional geography as the core of the intellectual discipline of geography from its beginning as a university subject in the eighteenth century in Western Europe, particularly Germany.

In the United States the first regional geographies were compendious descriptions on a country-by-country basis. The development of regional geography as a college and university subject took place only in the twentieth century. The origin of American regional geography stemmed in part from the realization that the United States is a country of continental dimensions with strong regional contrasts. European viewpoints on regional geography as expressed by Alfred Hettner in Germany, Paul Vidal de la Blache in France, and A. J. Herbertson in Britain also had an influence. American thinking on the nature of regional geography found its fullest statement in Derwent Whittlesey's chapter, "The Regional Concept and the Regional Method", in *American Geography: Inventory and Prospect* in 1954. He summarized the region as "an intellectual concept, an entity for the purposes of thought, created by the selection of certain features that are relevant to an areal interest or problem and by the disregard of all features that are considered to be irrelevant." (page 30).

World regional geography courses, in one form or another, date back to the beginning of American university geography. The standard practice of an early period was to divide the world into various types of physical or natural regions—landform, climatic, vegetation, or soil types. Good examples of this approach were Case and Bergsmark's *College Geography*, published in 1932, based on climatic types, and Preston E. James' *An Outline of Geography*, published in 1935, based on regions of broadly similar landscapes.

A major innovation in American world regional organization occurred in 1951 with the publication of the book *Culture Worlds* by Richard Joel Russell

and Fred B. Kniffen. The introduction to that book stated, "Of various possible approaches to the problem of presenting a regional geography of the world, that of culture worlds appears most logical, most interesting to students, and most likely to provide a sound background for studies in the social sciences and many other fields. Each culture world is a reasonably unified subdivision of the earth's surface occupied by peoples who are strikingly alien to inhabitants of other culture worlds. Each has its individual culture traits and its inhabitants have similar ways of changing landscapes." The regions were based not on physical elements but on seven great cultural worlds, divided in turn into culture realms and culture regions. Within a few years other college-level world regional geographies were published by Jesse H. Wheeler and associates, by George Kish and associates, by George F. Deasy and associates, by Allen K. Philbrich and most recently by Preston E. James. The differences in emphasis in the two approaches and periods are dramatically revealed by a comparison of the two books by Preston E. James published in 1935 and 1964.

Many geographers have a regional as well as a topical specialization and many departments of geography have a series of regional courses which in aggregate cover a large part of the world. Initially these specialized regional courses were by continents: North America, South America, Europe, Africa, Asia, and Australia. But this continental division was relatively useless, since hardly any generalizations of any significance applied to such regions. In the Americas the significant major regions are Latin America and Anglo-America not the continents as such. The Soviet Union is a unity even though it stretches across Eastern Europe and Northern Asia. North Africa and the Middle East have many characteristics in common utterly different from those of Sub-Saharan Africa. In each case the significant regional unities—cultural, linguistic, religious, political, ethnic, and historical—are not bounded by continental limits.

The geographers, the oldest students of regions, in turning from primarily physical regions to essentially cultural regions, now find themselves in a major multidisciplinary current of area studies, about which I wish to say a few words.

Multidisciplinary Area Studies

Interest on the part of American universities in some sort of coordinadte research and teaching on specific foreign areas by scholars from several disciplines dates back to the 1930's in the establishment of a number of programs on Latin America. Geographers, historians, anthropologists, political scientists, and teachers of Spanish were concerned with understanding the neighbors "south of the border," so close in space, yet so different in language, customs, history, and problems. Though large in number, such programs had mixed histories. At about the same time interest in the Far

East stimulated the establishment of a few courses of study of Chinese and Japanese language, history, geography, and international relations.

On the eve of World War II such area programs were few, scattered, and weak. But suddenly the United States faced military and political operations in parts of the world about which the country had little knowledge, less understanding and poor resources. Even the greatest libraries failed, for example, to contain key documents such as the census of Japan or the basic maps of the Soviet Union. The Army Specialized Training Program was hastily organized to train military personnel in the spoken languages and in an elementary knowledge of the geography, history, and society of areas in which the army was expected to operate. A Civil Affairs Training Program was created to prepare officers for military government in Germany and Japan. The Ethnogeographic Board in Washington in the Smithsonian Institution was established jointly by the National Research Council, representing the biological and physical sciences, the Social Science Research Council for the social sciences, and the American Council of Learned Societies for the humanities. It attempted to furnish to the government war agencies needed information on foreign areas and to act as a liaison between the academic communities and scholars, organized in general along disciplinary lines, and government agencies needing to coordinate complex military and political operations within specific world areas and cultures. The Board ceased its operations at the close of the war, but the need for the coordination of multidisciplinary study of the major world areas had become clear to many scholars, universities, foundations, government agencies, and informed citizens.

Soon after World War II the Carnegie Corporation and the Rockefeller Foundation made substantial grants to selected universities to aid in the development of programs of scholarly research and training on the key areas of the world. These programs established higher standards in the thorough preparation in appropriate academic disciplines, such as geography, economics, history, political science, anthropology, international relations, language, and literature, combined into comprehensive and balanced programs on specific non-Western areas. The Ford Foundation launched a program of area training fellowships, which sustained a large number of devoted and able students through the extra-long period of graduate training in which mastery of difficult and unusual languages and breadth of multidisciplinary coursework on a chosen region of the world were combined with advanced instruction in the discipline of specialization. The Ford Foundation also later made a series of substantial grants to selected universities which had undertaken long-range development plans in one or more non-Western areas.

Substantial university area programs now encompass all the major non-Western cultural areas of the world. They provide a rich new resource for the development of discriminating understandings of the principal cultural

realms. This resource is valuable both for graduate research and training and for undergraduate liberal education. It is so new that it has not yet been fully utilized.

Potentialities and Pitfalls in the Geographic Study of Foreign Areas

The study of foreign areas, either in a world course based on cultural realms or in the intensive concentration on one or more major regions, offers many potentialities for geography to contribute to liberal education.

Many of the problems which face the modern world have strong regional components, not fully recognized by policy makers or citizens in general. In economic development or technical aid, for example, any attempt, even subconscious, to transform other cultures to conform to American patterns poses questions of a most fundamental type. At the same time the impact of the evolving industrial and urban revolution will doubtless continue to transform societies around the world but in very different ways in different regions and cultures.

In the training of an informed liberally educated American citizenry sensitive, sympathetic, and perceptive to the problems faced by man in the major countries and cultural areas of the world, geography can play a valuable role. Geography is not, however, the sole window onto the panorama of the world's lands and peoples. But it is a picture window revealing a synthesis of physical, biotic, cultural, and economic phenomena associated in space in the evolution of distinctive regions.

What are some of the potential pitfalls of regional geography in liberal education? The following list reflects my personal apprehensions.

(1) Excessive regional subdivision. Regionalization for its own sake may be a valuable exercise for a professional geographer. But a world course for liberal education in my view should deal primarily with the world's great cultural realms and regions. A treatment of the Soviet Union in such a course that proceeded immediately to regional divisions and then to further regional subdivisions and found little room for a characterization of the country as a whole would in my opinion not lead to the most productive insights.

(2) Encyclopedic assemblages. A regional description may be a mere collection of unassorted and unrelated facts, anecdotes, and trivialities. I once heard a lecture on Latin America, not by a geographer, in which the speaker described each of the countries, in alphabetical order, but as he spoke of each country I observed that, except for place names, his statements could equally well apply to any other country. A geographer must ask: What are the significant statements that can be made about a country or a region that truly characterize it and clearly distinguish it from other areas? What are the relationships among these distinguishing characteristics of any region or country?

The regional or area specialist who lacks the keen edge of systematic or topical competence may suffer the weakness of the local antiquarian in history: he may accumulate a great store of facts but have little insight into their relative significance. Entering geography graduate students at the University of Chicago who have had undergraduate work mainly in a series of regional geographies of the continents or similar areas are typically weak in academic acumen and reasoning powers.

(3) Bias. The cultures of the world are so diverse, the value systems so varied, and unconscious societal projudices so ingrained that unbiased interpretations of diverse foreign peoples and lands are difficult. Even the best of our regional geographers may show various types of bias. It has been asserted, for example, that a recent major study of tropical Africa had a subconscious but perceptible white Protestant Christian bias. Regional specialists on specific areas often find the treatment of their regions in general textbooks to be prejudiced, shallow, and misleading.

Obviously there is an urgent need for an attempt to achieve a higher level of sympathetic and discerning understanding of world regions in the liberal education of the college youth of America. This may entail the cooperation of many geographers who are individually specialists on different regions. It may involve consultation with area specialists from related disciplines such as anthropology, history, economics, political science, and civilization and literature. The result might be somewhat broader than traditional geography but it should have a solid geographic core with integrated treatment of areal differences in culture, economy, and resources and natural conditions. The writing of such a penetrating regional geography is a difficult task. It would demand great skill in the utilization of the best research in geography and related disciplines in the discriminating selection of the major generalizations to be developed, and in the organization of integrated text, maps, illustrations, and exercises.

A Few Background References

Regional Geography

Hartshorne, Richard, "The Nature of Geography," *Annals of the Association of American Geographers*, vol. 29, nos. 3–4 (1939), 482 pp. Often reprinted.

James, Preston, E., "Toward a Further Understanding of the Regional Concept," *Annals of the Association of American Geographers*, Vol. 42, no. 3 (1952), pp. 195–222.

Whittlesey, Derwent, "The Regional Concept and the Regional Method," chapter 2 in *American Geography: Inventory and Prospect*, edited by Preston E. James and Clarence F. Jones. Syracuse, N. Y. Syracuse University Press for the Association of American Geographers, 1954, Second Printing, 1964, pp. 21–68.

Hartshorne, Richard, *Perspective on the Nature of Geography*, Association of American Geographers Monograph No. 1. Chicago: Rand McNally, 1959. 201 pp.

Pearson, Ross N., "Progress in Regional Geography," chapter 6 in *New Viewpoints in Geography*, 29th Yearbook of the National Council for the Social Studies, Washington, D.C., 1959, pp. 76–92.

James, Preston E., "The Use of Culture Areas as a Frame of Organization for the Social Studies," chapter 10 in *New Viewpoints in Geography*, 29th Yearbook of the National Council for the Social Studies, Washington, D.C., 1959, pp. 162–176.

Area Studies

Bennett, Wendell Clark, "The Ethnogeographic Board," *Smithsonian Miscellaneous Collections*, vol. 107 no. 1 (Publication 3889). Washington, D.C., Smithsonian Institution, 1947. 135 pp.

Hall, Robert B. "Area Studies: with special reference to their implications for research in the social sciences," *Social Science Research Council* Pamphlet No. 3. New York: Social Science Research Council, 1947. 90 pp.

Steward, Julian H. "Area Research: theory and practice," *Social Science Research Council, Bulletin* No. 63. New York: Social Science Research Council, 1950. 164 pp.

Bennett, Wendell C. *Area Studies in American Universities*, New York: Social Science Research Council, 1951. 82 pp.

"Area Studies" in *UNESCO International Social Science Bulletin*, vol. 4, no. 4, 1952, pp. 633–699.

World Regional Textbooks

Russell, Richard Joel and Fred B. Kniffen, *Culture Worlds*. New York: Macmillan, 1951. 620 pp.

Kish, George, ed., *An Introduction to World Geography*. Englewood Cliffs, N. J.: Prentice-Hall, 1956. 634 pp. Anglo-America by Stanley D. Dodge and C. Langdon White. Latin American by Clarence F. Jones and Robert G. Long. Europe by George Kish. The Soviet Realm by George Kish. Monsoon Asia by Robert B. Hall, John D. Eyre, and Forrest R. Pitts. The Near East by Douglas D. Crary. Africa by William J. Talbot. Australia, New Zealand and the Islands of the Pacific by Graham H. Lawton. The Polar Lands by Patrick D. Baird.

Deasy, George F. and Phyllis R. Griess, E. Willard Miller, and Earl C. Case, *The World's Nations: An Economic and Regional Geography*. Philadelphia: J. B. Lippincott, 1958. 962 pp.

Wheeler, Jesse H. and J. Trenton Kostbade, and Richard S. Thoman, *Regional Geography of the World; An Introductory Survey, Revised*. New York: Holt, Rinehart and Winston, revised edition, 1961 (first edition 1955). 674 pp.

Philbrick, Allen K. *This Human World*. New York: John Wiley, 1963. 500 pp.

James, Preston E. *One World Divided: A Geographer Looks at the Modern World*. New York: Blaisdell Publishing Co., 1964. 482 pp.

The Potential Contribution of Cartography in Liberal Education

ARTHUR H. ROBINSON

To begin let me define the significant terms.

By "cartography" I refer in general to the creation of a map for the use and enjoyment of the educated individual. Consequently, the term, as I am using it, involves a broad understanding of the many varied principles of map making; of the more precise elements of a map such as projection and scale; of the wide range of its qualitative aspects, such as sympolism, design, creativity—and even decoration; and with all of them liberally seasoned with an appreciation of the potentialities of the map as a medium for contemplative pleasure involving the communication of significant spatial ideas, facts and interrelationships. In short, what I am referring to is not so much how to make a map, but rather, what maps may be to one who understands them.

By "liberal education" I mean the guiding of the development of the individual with the ultimate objectives of helping him to understand the total world he lives in, to develop an abiding curiosity about all aspects of it, and to heighten his ability to think rationally and to feel emotionally—and, hopefully, to know the difference.

With these introductory statements let me turn immediately to a consideration of the several ways in which I think cartography can contribute directly to the aims of liberal education. In the major portion of the following remarks I wish to enlarge on seven assertions.

The first of these is that the designed graphic expression is a basic form of communication among humans. All evidence points to its existence very early in the development of man, and it is known among most primitive peoples. Writing, when considered as a form of communication, varies from the direct, unemotional, scientific report or tax form, on the one hand, to the subtle characterizations and moods of a novel, on the other. Graphics have as large a range but they are even more complex, for the media used are much more varied, ranging from the hues and values of color to black lines, and from simple or complex geometric organization to pictorial representation. Many of these elements seem to affect the physiologic perceptual processes in complicated ways in addition to their simpler symbolic meanings. The written or spoken word is capable, to some extent, of producing similar responses as a result of such things as alliteration, onomatopoeia, and other

rhetorical devices; but I do not believe these are nearly as complex as the colors, textures, patterns, balance, and so on, of graphic communications.

Unfortunately, in my view, the history, the principles, and the potentialities of graphic communication are not taught in either the depth or the systematic fashion with which we teach these aspects of the written language. What little is learned is only a meager dividend associated with the occasional course in art or design. Even in this, the main emphasis is likely to be focused toward providing an outlet for creative desire, and precious little is devoted to the direct study of graphics as a method of communication. There are no required courses in visual composition or appreciation to compare with English composition or literature; yet there should be. I am not alone in asking for increased attention to the graphic forms of communication. Many individuals involved one way or another with visual perception express similar views, and more than fifty years ago William Morris Davis wrote: "It is well known that there are many geographical matters which are better presented pictorially, cartographically or diagrammatically than verbally. Hence, it is just as important to study the proper and effective use of the various forms of graphic presentation, as it is to study the values of different methods, treatments, grades and forms of verbal presentation." ("The Colorado Front Range," *Annals of the Association of American Geographers*, 1 (1911), 33.)

The modern map, even a relatively simple, straightforward one, is an extraordinarily complex form of graphic expression because it is an artificial thing embodying, in addition to its visual complications, several transformations of reality in scale, shape, and symbolism that are quite beyond the normal experience of most people. To continue essentially to ignore this basic form of communication at higher levels of education is reprehensible in my opinion; it is especially so in American education, when we are now in a period when our immediate environment is no longer the local scene but is the larger region and in many respects the world as a whole, and our basic way of visualizing it must be by way of the map.

My second point involves not only the general desirability of the liberally educated populace to be appreciative of the importance of this method of communication, but also the need for this group actually to be able to read maps.

I firmly believe that we must promote greatly expanded instruction in what I must simply call "map reading and appreciation" while the student is in the "skill" learning phase of his development. Although some people, in later years, do buckle down and develop their abilities in areas that were missed in their education, this is not common. Basic map reading has become a necessary attribute of every educated person. I am not so biased as to equate it fully with the multiplication table or all of English grammer, but for "today's living" I will certainly put it on a par with such things as algebra, laboratory experiment, a portion—at least—of elementary logic, and probably a good share of what actually is done in English composition courses.

As geographers we tend to take as a matter of course the innumerable contacts we have with maps since, one way and another, we have learned to use them at least in a practical way. We do not realize, I think, just how much a mystery a map is to the cartographically uneducated and this includes most college graduates. Yet these people have much to do with maps in a variety of ways: in all sorts of books ranging from novels to foreign policy reports and from encyclopedias to textbooks, in most newspapers and dozens of magazines, on TV, at most public hearings on such things as school building or resource utilization, when driving a car, in flying, in innumerable government reports, and so on, to say nothing of the uses these college graduates will make of maps in almost any business or profession they get into. Furthermore, the atlas on the coffee table has again become a status symbol judging from the hundreds of thousands being sold in this country each year. Yet the average college educated adult hasn't the foggiest notion of what these maps could mean to him, or more important, what they don't tell him, or, even more important, what they seem to say that actually isn't so.

Let me relate an incident. Some time ago I agreed to talk to a conference group made up of a special selection of several dozen outstanding Wisconsin secondary teachers of history and social studies. I chose as my theme "Maps in the Classroom—Hindrance or Help," and to refresh my memory of what these people teach, I asked my daughter, then a senior in high school, to bring home a copy of any history book she had used. She brought one, and in leafing through it I was discouraged, to say the least. It was Zebel and Schwartz, *Past to Present, a World History*, The Macmillan Co., New York, 1960. It was printed with color, and it contained 68 maps, all but a few of which apparently had been especially drawn. There was no grid on any map and only five had scales. Almost no attempt had been made to take advantage of one of the basic potentialities of a map, its ability to show the correlation in place of several distributions, such as, for example, the relation of routes or occupance to terrain or climate. Various selections cut from a Mercator projection were employed, and odd, off-center excerpts from various other projections with considerable deformation had been used. Everything from generalization to linear symbolism was bad. (In the oral presentation slides of four examples were shown and commented upon.)

Now the sophistication necessary to read most history maps is not very great, but imagine the confusions in even the elementary concepts of direction, area, and distance the students receive when they study the maps in that book. It is not unique in having bad maps, as became quickly apparent in the discussion following my talk. My main purpose in referring to this experience here is, however, this: that book was selected and used in an excellent school in a supposedly liberally educated community. It was written by liberally educated historians, it had a liberally educated geographical advisor, and it was presumably taken through the complex editorial and publication process by a considerable number of liberally edu-

cated people. Viewed as a whole, the map program of that book is atrocious and is on a par with improper substantive emphasis, ungrammatical writing, and actual misstatement of fact. For educated people to write, publish, and select it as fare for high schools is a reflection, to say the least, on the content of our liberal education curricula.

Education in map reading carries with it the automatic dividend of an increased ability to read and appreciate other kinds of graphics. In teaching an elementary course in physical geography for more than fifteen years I have been impressed by the inability of students to read even elementary graphs and diagrams. They seem to approach them much the same way they do anything involving arithmetic, that is, they call it mathematics, automatically assume it is beyond them, and don't try. In spite of the fact that they go through life seeing things three dimensionally, it appears to be done without conscious thought; and when asked to observe the relation between two or more phenomena presented symbolically in two-dimensional terms, let alone three, they give up without an effort.

In our increasingly complex world the ability to comprehend spatial relationships in several dimensions is becoming more and more necessary to all citizens. It is especially so to the liberally educated who make up the majority of college graduates and upon whom will fall the major responsibility of judging and approving or vetoing the proposals made by administrations at all levels. As the pressure on resources continues to mount we may expect the citizen to be confronted more and more with the necessity to come to a decision regarding policies and operational proposals that concern questions involving spatial factors: the impounding of water and the extension of cropland, the allocation of water rights in a river system, the development policy on the urban fringe, urban renewal, foreign aid, and aerial spread of chemical insecticides, to name only a few. To these he must bring an understanding of the interrelation of numerous spatial factors, and the only real way he can develop this sort of thinking is through the study of and the gaining of a familiarity with the methods of graphic and cartographic communication and notation.

Fortunately, cartography may be treated easily in a progressive fashion. One may begin with elementary concepts with which we are all familiar, and then progressively add sophistication in terms of spatial concepts. The facts of amount at place can be transformed to methods symbolizing gradient, such as the isarithmic, and these may range from the familiar, such as slope, to the unfamiliar, such as persons per square mile per mile. They may be pushed to any desired degree of abstraction, such as rates of rates of change over area. The mapping of straightforward spatial correspondence may go so far as the mapping of residuals from regression, or even the variations in the magnitude of spatial correlations. A systematically structured approach to map reading that proceeds beyond the elementary phases (where such a course usually now ends), namely the basic topographic map, will do much

to make more elastic the perceptual and analytical abilities of the student in liberal education.

There is a third objective of liberal education to which cartography can contribute directly, and in some respects better than many other disciplines can. This is in the development of a critical eye. Although all methods of communication involve some kinds of restraints, cartography is rather more versatile in this respect. From the pedagogical point of view this is good, for the teaching of the way these constraints operate tends to make the student much more conscious of the problems of intellectual communication. Working with a visual technique puts the map maker under a kind of graphic duress, so to speak, since the results of his doings are so clearly apparent. I have found in my own teaching experience that, after exposing even the ordinary student to the various principles involved in map-making, he experiences little trouble in applying these in specific assignments involving the preparation of a critique. As a matter of fact many of their reviews are so devastating as to be embarrassing to the present state of cartographic art and science. This is not because they judge I will look with favor on destructive criticism; they are able to be constructive and to back up their judgments with chapter and verse.

There are a large number of cartographic elements subject to critical analysis, such as the handling of scale—in several senses, the employment of the various kinds of marks on a map from lines to letters, the manipulation of color, the use of the generalizing processes, and so on. Naturally, I cannot treat them all here; consequently, I shall limit the discussion to an attempt to show how an understanding of the obligatory process of cartographic generalization helps to develop a critical attitude, an attribute I suspect is universally acknowledged as a desirable objective of liberal education.

By its very nature, cartography is intimately involved with the intellectual processes of generalization, since a reduction to scale is implied in all maps. Even in those maps in which there is little variation in scale the processes of generalization require a number of conscious operations of which I select only two as examples: selection and classification.

No map can present everything; therefore, a selection must be made from among the possible components and this selection, perforce, is made in a rational fashion. If the reader is called upon to judge the quality of the map he must include this in his evaluation, and, in order to do so, he must attempt to understand the objectives of the cartographer in order to assay his selection of the various categories of data included. The reader must evaluate the role of significance as it applies to the test of the hydrography, boundaries, settlements, and other factors shown. Are the components chosen the ones relevant to the understanding or the appreciation of the relationships portrayed, or are they extraneous and put there only because some space needed filling or because "it has always been done that way"? I think you can see that even in this one aspect of generalization the critical review of maps is

exactly the same as the review of the quality of communication made in other media, such as writing or speaking. From the pedagogical point of view the map has the advantage that the components are visible and, in most cases, bear a direct relationship to the problem at hand. Any desired degree of subtlety, complexity, or intellectual (i.e. cartographic) sophistication can easily be exemplified among the thousands of thematic maps available.

The second element I wish to mention is the necessity of the classification process as an integral part of cartographic generalization. The liberally educated person must be able to evaluate the kinds and qualities of classification which are so necessary in dealing with almost everything in this complex world. Classification as an element of generalization is ideally exemplified in cartography, for example in the selection of class limits as an aid to communicating the characteristics of a continuous distribution whether it be an abstraction, such as population density, or the more concrete concept of mean temperatures. To evaluate and therefore to read properly such maps the student must appreciate the intrinsic characteristics of the distribution and observe what generalization has done by aggregating its variations. The tyranny of class limits in any classification becomes readily apparent when these must be portrayed as definite lines on a rigid cartographic base. I can think of no better way, than by their manifestations on maps, to bring out the necessary and desirable, but at the same time complex and confusing, qualities of the universal intellectual processes of generalization.

There are other aspects of generalization as a logical process, such as the inductive procedures necessary to locate many components of a map in the compilation process, or the deductive, commonly employed when we derive concepts from maps. These are clearly apparent in the cartographic context, but there is no point in belaboring the matter. Suffice it to say, that I believe the combination of intellectual and visual components and processes that characterize cartography are ideally suited to the development of a critical sense in the liberally educated person.

There is a fourth way in which cartography can contribute greatly to liberal education in quite a different fashion from those I have been discussing. Any truly liberally educated person must be able to see the current scene as simply a point in the continuum of time and of man's development. He must have a well developed sense of perspective, and certainly, today, of the rapidity of change. There are few results of man's activities that so closely parallel man's interests and intellectual capabilities as the map. Let me give you a few examples.

The attempts to determine the size and shape of the earth have been intimately coupled with cartography from the beginning. The early Aristotelian guesses, through the relatively sloppy estimates of Eratosthenes and Posidonius, their incorrect "correction" in later Greek times, the lack of concern in the medieval mind, the consequences in the period of grand exploration, the contribution of the French geometers in the 17th and 18th

centuries and the controversy over the prolate or oblate spheriod, the development of the equipotential concept and geodesy, and the current slight eccentricities of the orbits of satellites make a fascinating story. One cannot help but be impressed by the growth of men's minds, the ups and downs of his interests, the influence of his technical hardware, and so on.

That is but one example. Instead of limiting ourselves to something so seemingly specialized (but basically simple) as the size and shape of the earth we might look at the history of actual map making, that is, the history of cartography itself as opposed to the history of exploration, etc. Here we see a similar course of development. In such a survey the critical components become the long period of drawing and calligraphy, the development of engraving and its effect upon style, the development of lithography and the ability to produce shading easily, the development of symbolism, the sudden surge occasioned by photography and its marriage with the printing processes, the development of color as a standard component of maps, and the period of preprinted materials, scribing, and film manipulation in which we are now. All are reflected in numerous characteristics of the maps produced since the Renaissance.

The elements of cartographic history that parallel the other aspects of man's changing ideas are many: the growth of the topographic map, the changing fashions in map projections, the development of the representative fraction after the introduction of the metric system, the introduction of the thematic map as an outgrowth of the study of the social and physical world, to list but a few. The map is an ideal device around which to build such a study of man's changing interests and abilities because it is visible evidence.

The fifth point I want to make has to do with what I think is one of the more serious problems confronting liberal education. This is the increasing tendency toward specialization in our educational process. As a consequence of the increasing sizes of our institutions, as well as a number of other factors, I suspect that the student in the liberal arts college is tending more and more toward a relatively narrow education in a few fields with comparatively little attention being paid to their interdependence. Cartography is a subject that exposes the student to quite the opposite kind of experience.

The map is truly an interdisciplinary thing: it employs a more or less rigid mathematical framework on which ordinarily are arrayed elements drawn from the subject matter of the political, social, and economic studies as well as from the physical sciences; the design and preparation of it draws upon the fields of psychology and the fine and applied arts; it is an object created largely through logical processes; its lettering commonly requires an appreciation of some aspects of language understanding; and the end product is clearly a form of communication. Not many subjects available for study combine elements from so many fields. One can neither make an effective map nor study and appreciate one intelligently without some understanding of most of these elements.

To try to teach the interdependence of the fields of learning in the abstract is like trying to teach an appreciation of local landscape or ecology without field work, or the theatre without a stage. Furthermore, most maps are eminently practical objects and the student accepts them readily rather than as artificial or inconsequential things dreamed up by some scholar to take the fun out of going to college. Finally, I know of no learning experience that imparts to the student a greater feeling of accomplishment than that which follows the unravelling of the complexities of a map.

As the sixth of the basic assertions I am making I refer briefly to another aspect of liberal education. I assume there is general agreement that one of the most important objectives of liberal education is to instill in the student an appreciation of what he doesn't know. The development of intellectual humility is not easy especially at the age group we are concerned about. The map is an excellent tool with which to do this. Because of its complexity and because of its dependence on so many different fields, it is almost impossible for a student to be fully familiar with all the qualities and content of a given map. Because its components are tangible, that is, directly visible, it is difficult for him to gloss over the elements with which he is not acquainted. Because it is something that literally can be handled, turned around, measured upon, and pointed at, he likes to work with it. All in all, I do not think map study can be improved upon for this purpose.

The seventh entry in my outline suggests that there are some other aspects of liberal education to which I believe cartography can contribute directly, such as the necessity for students to become aware of the consequences of statistical manipulations. For example, the map can quite properly be considered a statistical device, consisting of a two or three dimensional coordinate system or space in which are displayed a series of elements, each with its particular array of x, y, and perhaps z values. Many of the distributions portrayed on maps are derived parameters, that is generalizations. As is the case when one is working with almost any statistical material he must proceed warily lest he stumble intellectually. What better medium could one use to instill this attitude in order, as Darrel Huff has observed, ". . . to avoid learning a whole lot of things that are not so." Incidentally, elsewhere in Huff's delightful little book *How to Lie with Statistics*, (W. W. Norton & Co. Inc., New York, 1954) he observed that "One of the trickiest ways to misrepresent statistical data is by means of a map."

There are other ways less important to be sure, in which cartography can contribute to liberal education, but I shall not try to develop these in what is already becoming a long paper. Instead I will turn to a number of rather lengthy comments which lead toward a conclusion. If there were suddenly complete agreement that a four-year sequence using cartography as the unifying theme would be an ideal component of a liberal education curriculum I would of course, assume I were dreaming. On the other hand, the

shock would force me to consider a number of practical realities. There are several, and I would like to touch on them briefly.

The first of these realities is that cartography is classed as a technique—quite properly—, and in our present frame of mind has not been generally considered to be of first class stature as a field of specialization by the group that usually houses its teaching, the geography department. It clearly has not carried the aura of intellectual quality we associate with regional geography, economic geography, etc. I do not mean to suggest that geographers have thought cartography to be unimportant: we have long passed that stage. I do mean, however, that geographers have generally classed it as a useful tool, but have not accorded it the respect usually given to English, statistics, foreign languages, speech, and much of mathematics. The fact that these subjects as taught in college, are also essentially techniques and tools, should give the relatively few geographic cartographers comfort, and perhaps it does if they take a long view. But those other educational fields are well established in liberal arts colleges and therefore have a multitude of practitioners; cartography is not and does not.

The second of these realities that I must face has to do with the fact that there is very little doubt that if the student is to learn anything about cartography he will do it in courses taught in geography departments. As a consequence, although it may appear as a lengthy digression, I would like to make some observations about geography in general. My reason for doing so will appear later when I make my concluding observations.

Ever since science began to eclipse the humanities as the dominant element in modern life, its effect has been felt in many ways. Geography has not escaped. There has been, among other things a proliferation of topical courses at the expense of the regional, to mention but one effect. Although in geography this general trend toward the scientific has materially aided the expansion of cartography as a field of learning in recent years, it has also tended to bias its development to some extent. The "science" aspects of geography and the "tool" aspects of cartography are pushing ahead with ingenuity, while the regional aspects of geography and the communicative aspects of cartography seem to be lagging. For example, it is generally not the geographers who are leading the way in their natural field, the "area programs;" it is the political scientists, the historians, and the language people, in short, peculiarly, it is those whose discipline is more humanistic. I urge that geographers put more emphasis on these aspects of their subject.

The total environment—by which I mean the array of all "natural" and "cultural" elements including man—is logically indivisible, and the development of the "feel for area" is as worthy an objective as the appreciation of any other human creation. After all, the earth in his mind is what man has made and is making of it, and the difficulties of attempting to develop such an appreciation are no more stringent than those within which the writer and the student of history, language, or literature works. Yet the study of literature

and communication is considered humanistic: geography is not. Few real attempts, outside literature, have been made in this direction, and very few by geographers, to my knowledge: but many are possible. An interesting example is that contained in Kevin Lynch's little book, *The Image of the City*, (Technology Press and Harvard University Press, Cambridge, 1960) wherein an attempt is made to characterize urban areas as distilled from the various reactions and concepts of their residents.

The region as traditionally conceived by geographers is a human creation, and in a very real sense it is a kind of artistic creation also, because it has a considerable emotional content. The regional mixture of inherited cultural traits and ideas interwoven with attitudes toward "physical" attributes is a sort of ever-changing ecological complex: and as a creation of man, it can be examined and assayed in the same way we punch, poke, squeeze or squint at the other creations of man in our study of his social attitudes, history, philosophy, literature, or art.

I do not wish to belabor this point but, in the broad view, "geography" (of an area) is really "all about" (an area) and embraces every aspect of it. What the student knows and thinks about "area" is extremely important in liberal education, and this kind of geography is more humanistic than it is scientific.

I have gone on at some length on this theme because I believe that cartography can be approached in the same way. Maps reflect attitudes, abilities, reactions, interests—not just individual maps made by individual cartographers—but even classes of maps grouped by period, by type, by utility or what you will. The variety is tremendous. At this point I would like to show you what amounts almost to a random selection of slides merely to illustrate this thesis—that maps reflect more than just their individual makers' character and talents. Also I would like you to note the changes of character that occur through time for I shall show them to you in approximate chronological order. Let me emphasize that this is not a cross-section of cartography, nor a brief look at the history of cartography, or anything like that; it is rather like a glimpse at a variety—a hodge-podge. I have included very little from the modern period, for example, for I assume you are generally familiar with the variety of the current cartographic scene. I shall move them rapidly and limit my comments for I want you to obtain a general impression.

Slide 1. (Figure 1. 2 p. 4 in Robinson, *Elements of Cartography*, (2d Ed.) John Wiley & Sons, New York, 1960.)
The relatively sophisticated Ptolemy world map as it probably would have been made around the 2d c A.D.

Slide 2. (Part of plate I in Nordenskiold, Facsimile Atlas, 1961.)
A detail of one of Ptolemy's maps. Note the clear-cut stylized treatment.

Slide 3. (A section of the Peutinger Tafel.)
Part of a Roman road map. A section of the Italian peninsula showing Rome. The map is at least ten or twelve times longer than it is wide. The first strip map.

Slide 4. (The Leardo map of 1452 or 53, AGS.)
An example of the symbolic T-in-O maps with Jerusalem in the center and Paradise at the top.

Slide 5. (Frontispiece of Cortesao, *The Nautical Chart of 1424.*)
A portolan chart of 1424. Note the preoccupation with the coasts, with little in the interior.

Slide 6. (Albino Canepa's map of 1480, plate XVI in Cortesao, *ibid.*)
Another portolan.

Slide 7. (Plate XLVII in Nordenskiold, *ibid.*)
The famous Ortelius world map of 1570. This was the beginning of a period of decorative and fanciful maps.

Slide 8. (Figure 179 in Skelton, *Explorers Maps.*)
Another Ortelius map (1573) showing the location of the mythical kingdom of Prester John.

Slide 9. (Plate 41, in Skelton, *Decorative Maps.*)
The Lion of Belgium, made in 1617.

Slide 10. (Plate 56, in Skelton, *Decorative Maps.*)
The decorative theme was in full swing in the middle 17th century. From Blaeu's New Atlas of 1635.

Slide 11. (Figure 92 in Tooley, *Maps and Map-Makers.*)
Fancy wasn't confined to decoration. This is Buache's map of Antarctica made in 1754.

Slide 12. (Figure 84 in Skelton, *Explorers Maps.*)
Or compare Jefferey's concise map of the legendary Northwest passage made in 1768.

Slide 13. (The Carte de Cassini.)
The middle 18th century also saw the beginning of systematic topographic mapping. This is a section of the first, the Carte de Cassini, highly stylized and with no understanding of land form.

Slide 14. (France 1:80,000, LeBuis S.O. (211).)
The second topographic mapping of France produced this a hundred years later. Please look carefully for the next slide covers exactly the same area.

Slide 15. (France 1:50,000, Vaison (XXXI–40).)
The same area as it appears on the third topographic mapping of France. Needless to say, a considerable development took place in less than 200 years.

Slide 16. This is a Japanese topographic map.

Slide 17. (AAA Triptik, 1963; Nat. Auto Club, 1955.)
Styles can vary considerably. These are two maps of the same

downtown area in Los Angeles produced for two different auto clubs.

Slide 18. (Figure 14, p. 33.)
This is Kevin Lynch's distillation of the same area from his book *The Image of the City*.

Slide 19. (p. 52, Schmidt, Social Trends . . . , 1944.)
Maps can be compared to English composition. This is comparable to the worst of fractured English, combined with weird syntax and impossible punctuation.

Slide 20. (p. 368, Reynolds, *Europe Emerges*, 1961.)
This has all the charm and vivacity of the minutes of a PTA meeting.

Slide 21. (Inside back cover of 2d Circular of IGU, 11th General Assembly and 20th IGC.)
This is the opposite. This is good composition, comparable to crisp, informative reporting at its best. From the 2d circular of the coming IGC.

My aim in showing you these examples was to impress on you several things: the variety of maps that have been made through time; the manner in which they reflect character—from the "scientific" maps of Ptolemy, to the symbolic T in O, to the fantasy of the 16th and 17th centuries—; the rapid changes that have occurred in the early modern period; the differing view points one may take in even the relatively straightforward urban map; the variations in the "literary" quality of simple maps and so on.

There is about as much validity in studying maps as human documents from these points of view as there is in studying the changing attitudes toward romanticism, symbolism, realism, etc., in period literature. This leads me to the third of the realities that I must face.

It is that even geographers themselves, with their proprietary interest in the field of cartography, are generally far less concerned with the more complex communicative and humanistic aspects of cartography than they are with the basic substantive material that appears on maps. It is true that cartographic errors and blatancies such as the improper use of Mercator, no scale or grid on a map, a dot map on a far-from-equivalent projection, and so on, do elicit complaints; but the usual editorial review of maps by geographers, even of those in theses they supervise, is rather superficial by comparison with their other editorial attitudes. I suspect that this results from the fact that much of the teaching of cartography, even today, is of a negative sort, more concerned with how to avoid actual mistakes rather than stemming from the positive attitude of reaching for excellence of communication. Even the negative sort is rather thin. For example, I am willing to wager that the majority of geographers in their, no doubt, one course in cartography spent a good deal more time learning to construct and draft a few map projections than they did on the analysis of the consequences to a map reader

of the various systems. This is exactly analogous to including spelling lessons and typing in a college course on English composition. What makes it even worse is that they probably took their course in cartography in graduate school.

Too many of us think of a map only as a tool, a more or less precise, factual thing which has no emotional or even much intellectual appeal. We use it, but we rarely appreciate it. We often say "that's a good map," but when we do, it is the same sort of judgment we make of a telephone, or an electric drill.

Occasionally one may hear, "I like that map", but it is not commonly followed by any analysis of its character and qualities.

Acquiring the ability to understand, to some extent, our emotional and intellectual reactions to various stimuli should certainly be one of the goals of a liberal education. This kind of analysis has long been taught in literature and composition courses. There, students and teacher "tear down" a piece of writing in order to find basic ideas—and then note the means employed by the author to bring about a personal involvement in his readers.

Every high school student—every college student—is required to learn the rudiments of English composition. They, themselves, must select a subject, gather data, make an outline, write the rough draft, accept criticism of it, and then turn in a finished piece of writing.

Very few of these students and not many teachers would recognize the parallel procedure in map composition: first, settling upon the objective, then compiling the data, deciding which to use and which to discard, preparing a "rough draft" employing a particular set of techniques, submitting to a critical evaluation, and finally producing a finished piece of cartography.

It is my belief that people who do have some exposure to this process in the making of maps bring to map reading a far greater appreciation of what a map really is.

The liberally educated person should be able to analyze a map—to understand that the colors used affect emotions, perceptibility, and legibility —that the projection employed provides organizational structure—that line width and character convey a variety of meanings—that the curve of a shoreline, the meanders of a stream occur because of conditions inherent in the earth itself—and so on.

I do not advocate advanced cartographic training for everyone such as is suitable for geographers—analogous to advanced literary training, but I do advocate cartographic education for everyone. Maps are used in such a variety of ways in our civilization that it is deplorable to find most of our map readers on a fourth or fifth grade level in comparison with their education in using and appreciating other methods of communication.

I would rather be positive than negative, however, so I would like to close with a serious proposal to this committee. It is that the committee urge the development of a year-length course in "map appreciation" at the undergraduate level. I am not speaking of the usual kind of course in "map

reading" with its primary concern for grid, geographic, or magnetic azimuth, advanced topographic map reading, and so on. What I am referring to is a course, without prerequisite, suitable for any liberal arts college undergraduate, that develops to some extent the kinds of things I have been talking about: a course that looks upon the map as one of the oldest methods of communication with a fascinating history; one that makes clear the roles of art, science, and technique in map-making; one that develops a modicum of critical judgment concerning the handling of the graphic elements of a map; in short, a course that, if taught well, will act as a magnet for a large share of liberal arts enrollments, and which incidentally might lead more students to take more work in geography. I think it can be done, and I think most geographers could do it if they wanted to.

Physical Geography in the Liberal Arts

M. Gordon Wolman

Despite Bryan's (1950) conclusion that "physical geography as a unified subject no longer exists", there was never a time when students of all kinds were more in need of a unified view of the elements of physical geography. The necessary splintering of oceanography, meteorology, climatology, micro-climatology, geology, seismology, limnology, hydrology, pedology, ecology, and astronomy, as separate so-called disciplines because of the rapid growth of specialized knowledge does not erase the fact that all are natural sciences, all are "field" sciences, and all deal with major aspects of the earth.

If, as presently appears to be the case, students have not received a rational introduction to a knowledge of the earth prior to entering college, then a liberal education presumably should include such an introduction. This can be accomplished in specialized courses. However, on rational grounds alone, excluding the fact that a large staff is required for the purpose and that few students will elect more than one such course, liberal education would appear to be better served by well thought out unified courses in earth sciences than by specialized courses which segment the field. In addition to the fact that a wider coverage is desirable and that time available in any program is always at a premium, as knowledge in many of the earth sciences has accumulated, generalizations as well as tools of expression have been developed which can unify and simplify previously nearly unrelated facts and fields. Wave phenomena, for example, are met within the atmosphere, hydrosphere, and solid earth. Similarly, common statistical problems are found in each specialized area, and such fields as geology-seismology-oceanography, oceanography-hydrology-meteorology-climatology, or climatology-ecology-pedology-geology are often physically inseparable. Within physical geography itself, Bunge and others have also pointed to unifying spatial concepts.

Recognizing the need for a unified approach, Strahler (1963) has prepared an introductory text divided into four major parts: the planet earth, the atmosphere and oceans, the solid earth, and landscape and soil. Strahler's effort, although a step in the right direction, omits the biological world including man. Hopefully, a more comprehensive treatment would correct this omission and improve on a good beginning. Pettijohn (1963, personal communication), for example, has suggested a somewhat broader coverage including the atmosphere, hydrosphere, lithosphere, biosphere (and homo-

sphere). The presentation of such a course can be qualitative or quantitative to varying degrees depending upon students and teachers. In any event, its purpose in a liberal arts curriculum is to acquaint students with the world of which they are a part and to give them some understanding of how it functions. The purpose is not to provide students with a first course in a specialized field.

It may be argued that a comprehensive course about the earth is not within the province of the geographer. I believe it is, certainly it once was, and there is no reason why it should not continue to be so. The concept of a physical geography was itself a unified view of the system as a whole. The word "synthesis" was less used, or needed, presumably because in many of what are now diverse fields contributions were in fact made by a few workers who ranged through all of them. It may be true that a purely spatial approach, although geographic, provides at best only a limited approach to a synthesis of the earth sciences. Neither the "provincial" nor the "methodological" argument, however, need deter geographers from contributing their talents to a comprehensive course in earth sciences. Rather, it would appear that both historical precedent and basic concepts of geography should lead geographers to play an active role in developing more unified approaches to the study of the earth.

Although emphasis thus far has been upon a contribution to be made by physical geography squarely within an area recognized by that name, a contribution of equal importance can be made to other areas within geography and thus also to the liberal arts. Here it is the task of the physical geographer to describe and analyze observations from the natural sciences in ways which will contribute to an understanding of the environment of man, thus contributing directly or indirectly to human, economic, and political geography.

In pursuing these objectives, physical geography is sometimes rather artificially separated into two broad but related parts. One is concerned primarily with the spatial distribution of both landforms and bio-physical phenomena, while the other gives special emphasis to the nature of the phenomena or to processes themselves. In a large enough frame, for example, the world and all of geologic time, a distribution may be encompassed or explained by the process itself, or vice versa, but for the here and now the distinction may be of some use. Within the systematic fields, distributions of selected parameters or combinations of parameters have always had inherent interest. At the same time, the distribution and behavior of physical phenomena have often received their strongest emphasis in regional studies and in analyses of environmental or man-land relations.

Despite our seeming inability to make an explicit field out of "regions" or of "environment and man", both are fascinating and comprehensive concepts of major current interest and appropriate to any liberal education. The fact that geographers have made and continue to make contributions to these

subjects seems, in the present context, to be sufficient warrant for geographers to talk about them to interested students.

In a good course in regional geography, a description of the region including the traditional topography, climate, and plant cover seems eminently reasonable. The topography need not evolve from the Cambrian but a fault-block mountain is often a better geographic description than a steep mountain, and an alluvial fan is again more appropriate than a gravel pile. More importantly a somewhat detailed explanation of the evolution of a basin and range topography is not out of place in a course designed with the object of contributing to a liberal education in mind. A planned "digression" on faults and circumpacific orogeny is not out of line in a course on the geography of California. For many a business man, historian, or poet, it may be his first and only collegiate exposure. Such relevant explanations can introduce to students new kinds of evidence, new techniques of inquiry, and important concepts.

It is also worth noting here that because generalizations in one field are often based upon limited analysis of information derived from other fields, the physical geographer can contribute to critical thinking by pointing out the assumptions, techniques, and nature of the evidence available, for example, in a diversity of areas such as physiography, ecology, or archeology. These subjects though commonly drawn upon in history and other social studies are uncommonly encountered formally elsewhere in most liberal arts programs.

Considering physical systems of interest to geography, Thornthwaite (1961) stressed the value of studies of heat and water budgets. The budget technique particularly related to cyclical phenomena, can be applied to both large and small scale hydrologic studies, as well as to studies of soil formation and landscape evolution. In addition to their intrinsic interest, such studies of the behavior of particular processes or phenomena provide essential reference points from which to study man's role in the environment.

To evaluate the magnitude and direction of a change involving an aspect of the physical or biological environment, an understanding of the behavior of the system is an obvious necessity. No reasonable analysis of grazing practices and erosion control on semi-arid lands, for example, is possible without a consideration of the interrelation of vegetation, precipitation, runoff, and sediment yield. Similarly, problems involving forestation, fire prevention, grazing, hunting, and recreation require a background of understanding of the functional physical and biological relationships among the many variables.

It is evident that any analysis of alternative uses of natural resources requires some inquiry into or assumptions regarding the character and behavior of the resource. Where the latter is renewable, evaluation of alternatives including their probable effects can only be made from a knowledge of the system, whether the problem be one of pollution dilution, return flow from irrigation, air contamination from fallout, evapotranspiraton

from plants, or the response of fishermen to sediment-laden water. The physical boundaries of such problems therefore logically form an integral part of any discussion of resources.

In addition to what might be called the functional relationships between the physical elements discussed above, recent studies (Kates, 1962) have pointed to an important association between human decisions and the statistical characteristics of natural phenomena. Although limited data have often dictated the use of mean or seasonal parameters as climatic and physiographic indicators, the frequency of floods, droughts, storm tides, or avalanches may be of greater significance in setting limits or in modifying man's occupance of the land. Man's response to the variability of natural events is of interest both from the standpoint of fundamental human behavior and because of the practical social and economic consequences which flow from this response.

One of the world's current major interests is the economic development of many lands. Hopes and plans rest on observations, data, and assumptions. Here again geographers can play a useful academic role in the liberal arts curriculum in introducing students to both the problems and possibilities involved in evaluating the "potential" of distinctive parts of the earth.

The dual roles of physical geography, by title and in collaboration so to speak, overlap and differ primarily in emphasis and organization and not in substance. The earth and the earth as the environment of man are by no means synonymous, but neither are they mutually exclusive, and the extent to which either approach is pursued at any one place will depend upon the outlook and talents of the available geographers and their colleagues, and upon the size and character of the institution.

None of the illustrations used here point clearly to a separate course on physical geography in the liberal arts curriculum. In the long run, save for the earth sciences as a whole, I do not feel that such a course is warranted. On the other hand, physical geography, or the sciences of the earth, rightfully belongs in the college of liberal arts at least until the schools improve their present performance. The differentiation of the earth and the peoples on it continues to be a subject of intellectual interest. Because physical geography plays a part in that differentiation both as a backdrop and as an active participant, a student of the liberal arts is entitled to an introduction to the landscape which includes something of its form, its history, and its behavior.

Should a single unified geography course prove desirable in some institutions, selected mathematical models may improve upon regions as a unifying mechanism. Some of these hold promise of providing techniques and viewpoints which can carry over from one to another systematic specialty in geography. This is especially true of techniques shared by physical geography and other special areas. Problems involving river flow, networks, and diffusion in physiography have their counterparts in economic and social phenomena. Coupled with adequate case analyses, historical incites, and

attention to reality, the models may lend not only imagination but a useful framework of organization to a geographic survey.

Hopefully, then, both the subject matter and the methods of approach in physical geography can contribute something fundamental to the formal elements of a liberal education. Perhaps several of these contributions can be illustrated by considering them in terms of some classical categories referred to as concepts, skills, facts, or attitudes in pedagogical jargon.

Several major concepts can be brought out through the study of physical geography. First is the fundamental concept of scale. Scale in both time and space is nowhere better illustrated than in the study of the behavior and history of earth and man. A feel for the magnitudes of earth phenomena is essential to a clear understanding of the world around us. In an age of space exploration and atomic bombs, a knowledge of the scale of earthquakes, atmospheric turbulence, and solar insolation is not irrelevant. A simple illustration is provided by the continuing controversy over off-site monitoring of bomb testing sites. To understand even the outlines of controversy, one must have some understanding of the nature of earthquakes, of seismic waves, and of their natural distribution. One would not expect a student exposed to physical geography to be able to evaluate the merits of such a public debate, but one would hope that such a student would understand the nature of the controversy and in particular would recognize the degree of uncertainty surrounding the debate. The same could be said about problems of fallout, diagnoses of plane crashes, and the occurrence of floods. Whether or not man has conquered his environment may remain a moot point. However, whether dominating or cooperating with the environment man must understand it.

Concomitant with an appreciation of scale is an understanding of the earth as a dynamic not a static system. Because of a preoccupation with local weather, common experience has a tendency to enforce a view that the environment is a discrete assemblage of local events. More useful, however, are concepts of the circulation of oceans and atmosphere, as well as the budgets of heat and water which characterize natural systems. These provide simple yet fundamental ways of viewing earth processes. Such a view is essential in considering man and the environment and to the non-specialist such systematic concepts can provide an essential framework within which new information and questions can continually be evaluated.

A third major concept deals with the nature of evidence, and a vital contribution of physical geography can lie in providing students with an insight into unique methods of scientific inquiry. While earth scientists like other scientists use both laboratory and sampling techniques, methods of natural history involving both spatial relations and interpretation of field associations in terms of time and space are unique to the field sciences. Interpretations of forest history, for example, involve first recognition of species and associations in the field and second understanding of the significance of their characteristics and distribution. The interpretation of spatial relations as practiced in

physical geography, particularly with the use of maps, is not only a skill but a true understanding of the technique leads to an appreciation of the fact that elucidations of history and of cause and effect can often be provided through careful mapping and analysis. Again, in an age of microparticles, advanced laboratory technology, and statistical analysis of social phenomena, it is essential that a liberal education provide individuals with the widest possible range of tools of thought or methods of inquiry.

Among the methods of natural history the singular approach of stratigraphy as employed in physical geography, particularly in geology and archeology deserves special mention. Although often overworked as an illustration with which to counter a current overemphasis on technology and laboratory inquiry, the fact that Darwin's immeasurable contribution derived solely from field observation does bear repetition. Such evidence and its interpretation is not part of the common experience of most students. The inferences which an archeologist, soils man, or stratigrapher draws from an assemblage of natural elements and artifacts found in a pile of dirt provide as illuminating an illustration of technique and method in science as one can find. Human beings possess a vast curiosity about their past, and some understanding of the concepts and methods used in reconstructing an immense span of time should not be omitted from their education. Because interpretation of a long span of the historical record is always based upon an understanding of the natural environment, as for example the use of soils as climatic indicators, a student's knowledge of the dynamics of natural processes will complement an inquiry into the stratigraphic record. At the same time, the study of historical sequences coupled with the principles of the natural sciences provides a unique opportunity for analyzing the distinctive attributes of natural laws as contrasted with so-called historical "laws". This is an important distinction discussed by Simpson (1963) and many others.

Although much of modern physics derives inferences about matter from what can be observed indirectly about the behavior of a portion of it, the technique of deriving conclusions from inferences suggested by indirect observation is nowhere better displayed than in the study of the characteristics, composition, and behavior of the earth. The existence and nature of the core, for example, are inferred from a combination of geochemical, seismic, and astronomical evidence. The nature of the evidence, the method of reasoning, the testing of alternative hypotheses, and the provisional character of many conclusions are elegantly illustrated in the study of the earth and its environment. Better tools will enhance such methods whose counterparts are found in behavioral studies and in space exploration and the lessons which can be learned from them cannot help but be significant in a liberal education.

The considerations outlined above perhaps represent an amalgem of some fundamental concepts, skills, facts and attitudes available to a liberal education through physical geography. Field observation and utilization of maps,

for example, can be viewed simply as skills. On the other hand, we are less interested in making astute field observers and cartographers of insurance men than we are in providing them with some understanding of how these techniques or approaches contribute to man's knowledge of the earth and of himself. Although sometimes tried, it is obviously impossible to discuss concepts without recourse to facts. Indeed, a major contribution of physical geography can lie in establishing or in attempting to establish the difference between fact, inference, hypothesis, and proof. While this desirable goal is a part of many other studies, physical geography does provide excellent and in many cases unique opportunities for realizing it.

Man is a part of the earth and its environment. This association, as noted elsewhere in this report, becomes more not less significant with the passage of time, with increasing population and increasing aspirations of peoples all over the world. The "big picture" does not become less important simply because it becomes more complicated. If a liberal education involves anything, it must certainly involve an attempt to understand man and the world in which he lives. Physical geography as a part of geography should contribute to this understanding.

The Role of Geography in Government

Arch C. Gerlach

By way of introduction, I want to make two explanatory statements: (1) I have not attempted to limit consideration of the role of Geography in Government to any direct connection with the curricula of Liberal Arts Colleges because that would call for selection on my part which could result in the deletion of material that some conference participants might find useful. (2) Much of what I have to say pertains to the role of professional geographers in Government, and thus to the development of an effective major rather than of a single course.

The role of Geography in Government is larger than many people realize. The total civilian employment of formally trained geographers in Federal agencies exceeds 500, or one out of every seven members of the Association of American Geographers. If we add to the geographers in Federal agencies those in the Armed Forces who are classified under MOS 8311 and those who are employed by state and local agencies, the total number constitutes a sufficiently large segment of our profession to warrant serious consideration while formulating education programs for career majors, or even for career minors. In addition to being a way of earning a living, sound geographic training can be a way to enjoy living; to get more out of life.

Perhaps it is even more important for the Liberal Arts Colleges to take into account the value of some geographical knowledge for nongeographers in Government. According to Bureau of Census statistics, the total civilian employment in Federal agencies last year exceeded 2,500,000, and in all Government agencies, excluding the Armed Forces, the total was nearly 9,500,000. What is Geography doing for them? What should it do for them? That is a big problem, but I am going to speak more from the viewpoint of Government needs and let you decide how to relate them to the college programs.

Another aspect of the role of Geography in Government is the place it occupies in Federal programs of higher education. I am not referring to the College Aid Bill for 1.2 billion dollars which was passed by Congress in 1963 to provide primarily for the construction of much needed classrooms, laboratories, and libraries for the nation's 2,100 colleges and universities. I am referring rather to the education and training programs being sponsored by

more than a dozen Federal agencies,[1] and to personnel improvement programs in many of the agencies. National Science Foundation support of this conference is substantive evidence of real interest in Geography and in the need for improving the content and methods of instruction at the college and university level. There is a growing demand for Geography in military training, in the Foreign Service, in the Peace Corps, and in the effective use of counterpart funds as well as in foreign aid programs. Perhaps it would be well to recall at this point a statement by General Eisenhower who said in 1945: "The country which teaches the most and the best Geography will secure the peace." Along the same line, I quote from a recent Government report:[2] "The adjustment of persons and institutions to the conditions of an uneasy peace, the rebuilding of devastated countries, and the establishment of a highly technical security system, together with the Nation's assumption of responsibility for strengthening the free world, made new demands on our educational resources. People, through the Federal Government, have looked, and continue to look to the colleges and universities for the preparation of professional manpower, the advisory service of faculty experts, advanced research in a great variety of fields, and the execution of training programs, both domestic and foreign." We should consider very seriously the role of Geography, through Liberal Arts Colleges, in such programs.

The actual and potential role of Georgraphy in Government is a topic of such broad scope that one person cannot possibly cover it fully. I shall attempt to present only an overview of the functions of those agencies with which I am best acquainted and which employ a considerable number of people with geographic training. I hope that you will contribute supplementary information as well as comments on the concepts, techniques, and methods which seem most pertinent to the work of those agencies. I am influenced, of course, by my own experience as a geographer in the OSS, Department of State, Library of Congress, and recently in the U.S. Geological Survey, with an aggregate service of nearly twenty years, intermingled with teaching at the universities of Wisconsin and Michigan, and occasional seminars and lectures in other universities. My acquaintance with Federal agencies has been broadened by contacts through friends, through the AAG Committee on Geography in Government, and through discussions at meetings of the Middle Atlantic Division of the AAG. I hope that with this back-

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[1] Department of Defense 39.8%, Public Health Service 30.0%, National Science Foundation 11.1%, Atomic Energy Commission 8.0%, Department of Agriculture 6.0%, National Aeronautics and Space Agency 2.6%, Office of Education 2.0%. Agencies which also contributed to research in colleges and universities between 1955 and 1960 to a significant extent were the Veterans Administration, TVA, Food and Drug Administration and Departments of the Interior, Commerce, Justice, Labor, and the Treasury.

[2] U.S. Department of Health, Education and Welfare: A Survey of Federal Programs in Higher Education. Office of Education Bulletin 1963, No. 5. Washington: Superintendent of Documents. 1962. $0.25.

ground, and with your help, we can collectively achieve a valid perspective of Geography's role in at least the Federal agencies.

The Civil Service Commission

Employment in most agencies of the Executive Branch of the Federal Government is controlled by the Civil Service Commission. It establishes standards for each field of employment, rates positions for salary classification and, in many fields, administers examinations and maintains registers of qualified applicants. Only in a few "excepted agencies" such as CIA and the Atomic Energy Commission may employment be effected without going through the Civil Service Commission, and those agencies maintain comparable standards plus rigorous security controls.

The Civil Service Commission prepared in April, 1963, a draft of new occupational standards for the Geography Series, GS–150. Because the Commission controls employment in so many Federal agencies, it seems appropriate to consider a few quotations from its Standards for Geography. Before proceding with the Civil Service definition and analysis of Geography, however, I want to emphasize that to me Geography is a way of thi ıking rather than a body of knowledge. Please keep this concept in mind while considering the following quotations from the Civil Service Standards.

In the introduction to the revision of those Standards we find the statement that: "The development of revised Standards has been complicated by the heterogeneous nature of the programs in which geographic positions are located and the cross-disciplinary subject matter with which geographers are concerned." A little later we come to the definition of Geography as: ". . . the science that observes phenomena of the earth and attempts to put them into meaningful perspective. In general, Geography wants to know how much of what is where, why it is there, and what its significance is to nature and man. It does this by determining the location and distribution of observable phenomena, by pointing out the differences that exist among things that seem to be alike, by finding out the relationships that exist among the phenomena observed, and by ascertaining the significance those relationships have for nature and for man. Subjects of geographic observation include landforms and terrain, natural resources, climate, plant and animal environments, and man's natural and institutional environments. Geography observes these in a space-time continuum which serves as an aid to observation and to understanding the processes by which such things change."

We find here, in effect, recognition that Geography serves as a bridge between the Physical and Social Sciences and as a connection between them and the Humanities. The Standards go on to say that: "Geography is distinguished from related fields by 1) its cross-disciplinary interest in the phenomena of the earth; 2) its graphic and taxonomic approach toward observing, recording and presenting geographic information; and 3) its integrative effect in interpreting and determining the significance of relation-

ships which exist among the various phenomena . . . Successful performance of work in Geography requires sufficient academic study to develop the insight and breadth of knowledge needed as a basis for continuing training and development in the field." The minimum requirement for employment as a geographer is 15 semester hours creditable toward a major and nine hours in related courses.

Although neither the definition of Geography nor its elaboration by the Civil Service Commission cover all of the possible variations of geographic work or the relations existing between Geography and other occupations, the Commission does provide some interesting specifications for rating positions in the Geography Series. The introduction to those specifications says: "This series includes positions the duties of which involve professional work in the field of Geography, including the compilation, synthesis, analysis, interpretation and presentation of information regarding the location, distribution, interrelationships and processes of change affecting such natural and human phenomena as the physical features of the earth, plant and animal life, and man's settlements and institutions . . . The synthesis, analysis, and interpretation of geographic information results in: a) information for the production of accurate maps, charts and gazetteers; b) standardized geographic nomenclature; c) studies to show and compare the distribution of phenomena; d) regional and area studies; and e) research into the causal relationship and significance of observed features and events."

In distinguishing geographic positions from somewhat similar positions in other series, the Civil Service Commission recognizes two types of situations: "1) The first situation concerns positions involving geographic work which parallels specializations in other series. These are positions which involve work in specialized subject fields such as Climatology, Geomorphology and Urban Geography, and which are of interest to Geography as well as to other disciplines, but where there are distinguishing features in approach and techniques that result from training in and the focus of interest on the respective discipline. In such cases, geographic positions may look very much like positions which belong in other series, but a distinction, based on approach and job content, can be drawn through careful analysis. The position is properly allocated to the GS–150 series if it has as the major purpose of research involved, the understanding and explanation of a) why things are located and distributed in a certain manner; b) the significance of such location and distribution to other phenomena, both natural and human; and c) the processes of geographic change. Research not primarily concerned with these factors (for example, research into the fundamental nature of a specific phenomena) should be allocated to the appropriate physical or social science series. For example, research on the nature of solar and reflected terrestrial radiation may be of considerable interest to geographers doing climatologic work, but work of this kind, depending upon various factors, is likely to be classified in the Meteorology (GS–1340).

Physics (GS–1310), or the Geophysics (GS–1313) series. However, properly classified to the Geography Series are positions whose incumbents take the findings of meteorologists, physicists or geophysicists regarding the nature of solar and reflected terrestrial radiation, and use such information to understand its distribution and the relation and significance such radiation has to the heat balance and temperature of the earth.

"2) The second situation involves work which may be equally the concern of Geography and some other disciplines. For example, Geography is concerned with the impact geographical factors have on such economic activities as mining, manufacturing, forestry, tourism, agriculture, fishing, trade, transporation, etc. Analysis of such impact and the significance of geographic factors to economic endeavors requires varying degrees of economic knowledge in addition to geographic knowledge. Within the profession of Economics, the Regional Economist performs a similar function. Thus, the work may be considered as involving and belonging equally to more than one discipline. In a comparable manner, geographic work may involve working in fields which are on the disciplinary borders with Cartography, Geology, Meteorolgy, Statistics, Physics, Geophysics, Anthropology, etc."

Having reviewed the bases for determining when a position is, or is not to be classified in the Geography Series, let us return to the requirement of 24 semester credits in Geography, with as many as nine of them in related fields, to see what courses are most favored by the Civil Service Commission. The published Standards for the Geography Series state categorically that: "The existing specializations—physical, cultural, and general—have little meaning when applied to specific positions." Consequently, emphasis is given to topical fields which are the chief concern of Geographers in Government, although it is recognized that positions are often involved with work in more than one of these fields. The six topics which are recognized as potentially geographic, in addition to thematic Cartography, which is classified in a separate series, are:

"1. *Topographic*. The work of Federal agencies may be concerned with terrain characteristics affecting navigation, logistics, intelligence, and geographic standardization. Such work involves the distribution of land, water, soils, vegetation, etc.; the configuration of the earth's surface, including its relief, drainage, cities, transportation routes and facilities, etc.; and the changes that take place and the processes involved in the evolution of both the physical and cultural landscape.

"2. *Climatologic*. Geographers may be concerned with the orderly organization and use of particular atmospheric data to describe overall climatic conditions and to do research into the causes and processes of climatic change, including determining the significance of climatic conditions on such activities as defense, conservation, agriculture, health preservation, transportation, marketing, and supply.

"3. *Economic.* Geographic investigations in this area are intended to determine whether certain economic activities such as mining, forestry, manufacturing, agriculture, commerce, etc., should be continued, or can be established on a viable basis; or to determine the most feasible way to put the existing resources of an area to use.

"4. *Regional.* Regions may be designated arbitrarily, but are usually fixed by topographic, climatic, political, economic, or socio-cultural conditions. The geographer may be involved in determining the boundaries or specific frame of reference for groups of features or events, or he may need an intimate knowledge of all significant phenomena in the region to bring about a full understanding of it. In the latter case, he needs some knowledge of the history, customs, and languages of the region as well as an awareness of its economic, political, and social problems.

"5. *Political.* Political conditions have an impact on Geography and vice versa. Geographers may be concerned with defining and describing area and national boundaries, including political and administrative subdivisions; and with the explanation and interpretation of the relationships of geographic conditions to political situations and problems.

"6. *Urban.* Geographers are concerned with both the physical and human phenomena which comprise an urban area, and the way the land is, or can be utilized. This involves knowledge of the patterns and density of populations, including the functions, types, groupings and distribution of housing and other buildings, and the significance of geographic factors to urban areas."

Perhaps we can gain deeper insight into the objectives of courses in those fields if we consider the knowledges and abilities required for various positions in the Geography Series. Those items which reappear most frequently in the specifications for geographic positions in the Federal Government are:

1. A basic knowledge of the principles of Geography.
2. A strong background in the general, world-wide complex of both Physical and Human Geography.
3. Familiarity with graphic representation of facts.
4. Knowledge of conditions and developments in a variety of the six topical fields mentioned above.
5. Intensive knowledge of a group of specific geographic features and events.
6. Ability to read and interpret maps and charts of different scales and projections, and to interpret aerial and other photographs.
7. Possession of taxonomic and bibliographic skills.
8. Skill in making terrain analyses and in making other analyses based on location and distribution theories.
9. Ability to present and illustrate geographic information in good written and graphic form.

10. Capacity to integrate geographic information for presentation from either an area or regional viewpoint, or from the viewpoint of one of the topical fields of emphasis within Geography.
11. Ability to use statistics and statistical methods; i.e. statistical tabulations, frequency studies, probability studies, and quantitative analysis.

There is a false impression that because the Geography Register of the Civil Service Commission is closed, it is not possible for geographers to be employed as such in Federal agencies. It is true that the Geography Register has been closed for several years and that there is little probability of its being opened in the near future. It is too expensive to establish and maintain registers in fields which have only a small turnover in Government agencies. There are, however, several alternatives through which geographers may be employed in Federal agencies. There are:

1. The Federal Service Entrance Examination. This is a written examination which is given at all Civil Service Commission offices every two or three months. It is a combination of intelligence and aptitude tests for positions at grades GS–5 and 7. For a GS–5 rating ($4,960 per year) as a geographer, a college degree is required, with 15 semester credits applicable toward a Geography major and 9 credits in closely related fields. For a GS–7 ($5,795 per year), the applicant needs 30 semester credits in Geography and related fields, with at least one year of graduate study or of work experience as a geographer.
2. Examinations in related fields. Geographers have successfully passed the examinations and been employed in Federal agencies as City Planners, Social Science Analysts, Economists, Foreign Affairs Officers, International Relations Officers, Intelligence Research Specialists, Military Research Specialists, Junior Management Assistants, Agricultural Marketing Analysts, Archivists, Archeologists, Cartographers, Geologists, and Special Librarians. It would seem highly desirable, therefore, for a geographer who is considering a career in Government to take a strong minor in one of these fields. He can then enter a Civil Service position through an examination in his minor field and subsequently transfer to a geographic position.
3. Transfer or reassignment. A status employee at any grade or in any field can be transferred or reassigned to another position or field for which he is qualified.
4. TAPER appointments. Temporary appointments pending establishment of a register may be made without recruiting from the Civil Service register but they have some disadvantages. The incumbent is vulnerable in case of reduction-in-force, and is not eligible for promotions. The employer who wishes to do so may, however, circumvent that blockade by setting up another position at a higher grade and reemploying the individual in it.
5. Agency registers. Local registers may be set up if the agency will request and obtain authority for a Local Board of Examiners. Several agencies,

such as the Army Map Service, Department of the Interior, and Department of Commerce have such local boards. The Personnel Officer of the agency must nominate staff for the local board and have them approved by the Civil Service Commission, then issue an agency announcement of vacancies and rate applications on the basis of standards established for Geography Series 150.

One should also take into consideration the many geographers in the Armed Forces, in the Foreign Service, in overseas assignments for AID, or employed in "excepted agencies" such as CIA, AEC, NASA, and TVA. Others are employed in the Legislative Branch at the Library of Congress or on standing committees of Congress.

Geographic Functions and Positions in Federal Agencies

Perhaps it will be useful, in considering the nature of geographic training to fit approximately 15% of the geographic profession for Government service, if we review briefly the major functions and objectives of a few agencies which employ a considerable number of geographers.

1. *Department of Defense.* Quantitatively speaking, the Department of Defense is the chief employer of geographers in Government. The job titles, however, frequently fall under different headings such as cartographers, intelligence analysts, physical geographers, environmental scientists, regional specialists, instructors, map librarians, or transportation specialists.

The principal places of employment within the Department of Defense are: the Army Map Service, which is primarily responsible for the Foreign topographic mapping program of the Department; the Aeronautical Chart and Information Center, which is responsible for the foreign and outer space charting program of the Air Force; the Naval Oceanographic Office (formerly Hydrographic Office), which is responsible for foreign navigation charts and for a rapidly growing oceanographic research program; the Offices of Naval Research and of Naval Intelligence; the relatively new Defense Intelligence Agency; the Offices of Research and Development in the Army and Air Force; the U.S. Army Natick Laboratories; the GIMRADA (Geodesy, Intelligence and Mapping Research and Development Agency) at Ft. Belvoir; and the Officer Training Headquarters and schools of all three Services in the Department of Defense, as well as the many colleges and universities throughout the country which are involved in training military personnel experienced military personnel are sent to school for additional training.

2. *Department of Commerce.* Although many of the positions filled by geographers in the Department of Commerce are not classified in the GS-150 Series, there are many geographers in the Department. Most of the cartographic work is done in the Coast and Geodetic Survey which is responsible for the navigation charts, both sea and air, of the United

States and its dependencies, but cartographers are also employed in the Bureau of the Census, Weather Bureau, and the Area Redevelopment Administration of the Department. Economic and statistical work is also done by geographers, particularly in the Bureau of the Census and the Area Redevelopment Administration. Physical geographers with a strong background in Meteorology and Climatology are employed by the Weather Bureau, especially in its Office of Climatology. Transportation experts are sometimes employed, usually on a consultant basis, in the Bureau of Public Roads, and map librarians find most opportunities in the Coast and Geodetic Survey.

3. *Department of the Interior.* Opportunities for geographers in the Department of the Interior are numerous and varied. Geographic names specialists constitute the largest group. Those dealing with foreign place names are in the Office of Geography, and those with domestic names are in the Geological Survey. Economic and regional geographers have recently been in great demand by both the Bureau of Indian Affairs, which is trying to improve the economic development of reservations, and by the newly established Bureau of Outdoor Recreation. A few thematic cartographers are employed by the Geological Survey in the production of base map series and special subject maps. A considerable number of geography and map librarians are employed in connection with research on geographic names, and a few resources specialists with strong backgrounds in Geography are employed by the Geological Survey in its Water Resources Division or used as consultants in other bureaus and offices of the Department.

4. *Department of State.* The aspects of geographical training which are given greatest emphasis in the Department of State are: Regional Geography, where an intimate knowledge of local languages, cultures, and economic activities of fairly large areas are needed by Geographic Attaches and geographically trained Science Attaches as well as Consular and other Foreign Service Officers and administrators of USIA and AID programs; Cartography and Map Librarianship for Geographic Attaches and employees of the Office of the Geographer; and Political Geography, both as it pertains to boundary problems and to the political activities of nations.

5. *Independent Agencies.* Among these are the CIA (Central Intelligence Agency), which employs a large number of geographers for thematic cartography of foreign areas, regional specialists, and experts in photo interpretation; the OCD (Office of Civilian Defense), which is especially interested in urban geographers, regional specialists, and experts in transportation; and NASA (National Aeronautics Space Agency), which wants geographers to determine which features and conditions, that may be observed through photos from space, will be of most significance a decade from now.

6. *Legislative Branch of the Government.* Many geographers are called in as consultants for Congressional committees dealing with a very wide range of subjects, but the number of geographers regularly employed in the Legislative Branch of the Government is relatively small. About twenty map librarians in the library of Congress have formal training as geographers, but only the top grades are classified in the GS-150 Series. Some geographers are also employed as research analysts in the Legislative Reference Service and in specialized Divisions of the Reference Department. The research analysts are generally required to have a strong background in Economic, Political, or Regional Geography. A few geographers with topical specialization in the latter fields are employed by standing Congressional committees such as the one on Interior and Insular Affairs.

Training Geographers for Government Positions

It appears from a perusal of work performed by geographers in Federal agencies that aspects of the discipline which are most used in those agencies are Cartography, Economic and Statistical Geography, Physical, Urban, and Transportation Geography, Map Librarianship, Toponymy (geographic names specialists), and geographic instruction in various personnel improvement programs.

On the basis of personal experience and observations of work in Federal agencies, and in the light of Civil Service standards and requirements, I urge that, in the training of professional geographers, attention be given especially to the following concepts and skills:

1. Concepts
   a. Significance of place and position.
   b. Scale as a way of thinking rather than a method of measurement.
   c. Regionalization—with an understanding of its philosophy, values, and hazards.
   d. Dynamics of change—in population, resource use, transportation, interchange of ideas, sequent occupance, spatial interaction, and political maneuvers.
2. Skills
   a. Map reading.
   b. Cartography and its relation to reproduction techniques.
   c. Statistical analysis.
   d. Foreign language competence.
   e. Editorial proficiency.
   f. Meaningful and accurate generalization.
   g. Use of geographic reference tools.
   h. Field observation and data gathering.
   i. Ability to prepare and administer projects of an interdisciplinary nature.

It is my firm belief that disciplines serve to educate people rather than constituting, in themselves, segments of education. The young men and women of our colleges and universities can receive a liberal education, and a useful one, through Geography, just as well as through a variety of other disciplines.

Geography in International Scientific Organizations

Professionally trained geographers from the United States should have a sufficiently strong background in the history and philosophy of the subject, and a sufficiently broad knowledge of geographic work in foreign lands, to deal intelligently with foreign colleagues. This seems especially important in the case of Government employees. Consequently, I want to mention before closing, the three international organizations in the field of Geography.

1. The Pan American Institute of Geography and History is the only inter-governmental organization in Geography. The members are the independent countries of the Americas, and their Governments affiliate through the Departments of State or of Foreign Affairs. The Institute has Commissions on Cartography, Geography, and History, and many Committees and Working Groups which carry on the scientific work of the Commissions. The Geography is mainly regional or economic in nature, with heavy emphasis on resource management and regional development programs.
2. The International Geographical Union is the best known and the broadest in scope. Of its 17 Commissions, six deal with some aspects of Cartography or Map Librarianship (Ancient Maps, Library Classification of Maps, National Atlases, World Population Maps, Land Use Mapping, Photogrammetry, and Cartography). There is also a strong emphasis on Physical Geography, with six Commissions (Karst Phenomena, Evolution of Slopes, Periglacial Morphology, Erosion Surfaces around the Atlantic, Coastal Morphology, and Applied Geomorphology). Two Commissions are regional in character (Humid Tropics and Arid Zones), two are methodological (Methods of Regionalization and Teaching of Geography), and one deals with Medical Geography. There is strong probability that new Commissions will be established in 1964 on Statistical Geography, Agricultural Typology, Regional Planning, and Cartography. The latter (Cartography) would be, in effect, the present International Cartographic Association, which has applied for affiliation with the International Geographical Union as one of its Commissions.
3. The International Society of Geographical Pathology, like the International Geographical Union, is a non-governmental organization of scientists whose national associations affiliate through the Academies of Science or comparable organs of each country. The objective of the International Society of Geographical Pathology is to study relations that

may exist between diseases and the geographical environments in which they occur.

We find, however, that geographical participation in international organizations beyond the scope of these three is common. For example, a geographer is on the Executive Committee of UNESCO's Committee on Education. Geographers are on the Council of the International Council of Scientific Unions (ICSU). Geographers are taking an active part in the preparation of a world atlas of agriculture for the Food and Agricultural Organization (FAO), and an atlas of climatology for the World Meteorological Organization (WMO). The scope of preparation for such work, whether for our own Government or for international programs, must be both broad and specific, if the individuals concerned are to fulfill their particular responsibilities and at the same time understand their colleagues. The Liberal Arts Colleges can do much toward the preparation of graduates for such work, and it should be obvious that Geography can play an important part in their curricula.